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ABSTRACT

This report defines manpower planning and explains its current popularity. The experiences of individual businesses are used to develop techniques for projecting manpower supply and demand and future manpower needs. The role of manpower in the corporate plan is considered. (BH)

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Manpower Planning:
Evolving Systems

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Highlights for the Executive

THERE IS NO UNIVERSALLY accepted definition of what "manpower planning" is or what activities are involved in carrying out the function. Companies engage in formal manpower planning in order to deal with the current and potential manpower problems that are significant to them; because these problems differ among companies, so too do their responses.

What they do, in various combinations, is to forecast their needs for manpower in the future, forecast the internal labor supply for meeting those needs that their present employees represent, and identify the gaps between what will be needed and what will be available. They develop plans for recruiting, selecting, and placing additions to their manpower. They plan for the training and development needed to keep employees abreast of new skills that will be required. They anticipate the promotions and transfers needed to realign the work force in the face of changing conditions. They anticipate the labor costs involved in paying for the manpower resource.

Why the Interest in Manpower Planning Now?

None of these activities is really new—they are traditional personnel work. What is new, in some companies, is an emphasis upon integrating these activities one with another to achieve a balanced manpower program, and integrating the planning for manpower with the other business planning so that the manpower program will really help to achieve the company's business objectives. There is also an emphasis upon pushing the time dimension of the planning a bit further into the future than has heretofore been the case.

Changing conditions, both inside companies and in the business environment in which they operate, have prompted the increased interest in better planning for manpower. Among these conditions are:

- Rapid technological change, which has changed the skill mix required in a company's work force and promises to bring about even greater changes in requirements in the future
- The long lead time necessary for the training and development of employees to handle new knowledge and skills successfully
- Tight labor markets in recent years, which have remained tight for some skills even in periods of recession
- Changes in the age distribution and educational levels of employees
- The spread of systems-thinking about company operations and the emphasis upon planning generally
- The use of the computer to handle voluminous personnel records and to analyze the data in ways that were not practicable heretofore
- Government action, both in setting an example through its own manpower planning efforts and in establishing new requirements for manpower planning in connection with programs to employ the disadvantaged.

Forecasting Manpower Needs

Much of the interest in manpower planning has centered around finding techniques for forecasting manpower needs and supplies for the long-range future. Such forecasts can be made in two ways. Direct estimates—that is, educated guesses—are made of the manpower needs of the future, both in numbers and types of employees. Projections—that is, mathematical extensions into the future of data about present and past uses of manpower—are used to do the same thing. In either case, company experience reveals that the accuracy and utility of the forecast depends upon the managerial judgment that goes into selecting the factors upon which to base the forecast and into making necessary adjustments to the raw figures.

For instance, the choice of a predictor variable can present thorny problems. The predictor is the business factor to which manpower needs are related. It must reflect the level of business operations as well as the manpower input required to produce that level of operations. Physical product volume has been used but it presents problems to a company making a variety of products and services. Dollar value of sales has been used, but it must be corrected for the effects of inflation and for changes in the ratio of purchased goods and services to value added reflected in the selling price. Physical assets or investment has been used, but it requires adjustments for changes in inventory levels and for the differing effects upon manpower needs of investment in new plant as opposed to investment in remodeling of old plant. Careful analysis is called for before an appropriate predicter can be chosen, yet that is only the starting point for making a forecast.

The historical relationship of manpower levels to levels of the predicter must be determined for several past years so that the effects of changes in productivity can be plotted. The trend in productivity change must be examined to determine whether or not the same rate of change can be expected in the future. With needed corrections made, productivity can be projected to the target year for the forecast, related to the level of the predictor variable forecast for that year, and manpower needs determined.

Different considerations come into play in attempting to forecast the needs for specific groups of employees, such as technicians or management personnel, but the same general procedures are followed. And, companies stress, the experience of competent managers must come into play in interpreting the results of the arithmetical exercise if the forecasts are to have value.

The Manpower Planning Unit

One thing is clear from the study: no matter how a company defines manpower planning, the function is too broad to be carried out completely by a specialized manpower planning unit. At the very least, information about business plans upon which manpower needs are based comes from marketing, manufacturing, and financial staff units, and from operating executives. Where the corporate planning process has been formalized into an integrated corporate activity, line and staff managers at all levels and in all functions of the company play some role in the development of manpower plans.

Still, some companies have created specialized manpower planning units in their personnel functions. The role of these units is most often to develop special techniques for planning in the manpower area and to encourage their use by the rest of the organization. The unit may assist in the preparation of planning guidelines for the corporation that are used by divisional personnel in the development of long-range plans. The unit may be called upon to monitor the planning process to ensure that adequate attention is paid to manpower considerations and that the process is going according to schedule. And it may well have a role as a reviewer of the manpower portions of plans that are submitted by the divisions.

Where a special manpower planning unit does not exist, the function may be carried out by a management development or organization development unit, by a recruiting and placement unit, or by some other group within the personnel function.

Manpower Planning in a Recession

In the recession year of 1970 the focus of manpower concerns shifted from the long-range future to the problems of the present. However, while companies have had to alter or to temporarily shelve their long-range manpower plans, they feel that they are in a better position to deal with the problems of the present because of the information they now have about manpower and its use—information they would not have had if they had not engaged in a formal manpower planning effort.

Manpower Planning: Evolving Systems

By Walter S. Wikstrom

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A Research Report from The Conference Board

Foreword

Misallocations of the nation's manpower resources have prompted various scattered attempts at national manpower planning, at the forecasting of needs for particular skills, and for the development of trained personnel to fill those needs. That the problems still exist is *prima facie* evidence that the nation has not yet achieved a workable system for making the most effective and efficient use of the labor force, actual and potential. But the efforts to develop a more rational approach continue and, the latest headlines notwithstanding, there is evidence that with the accumulation of experience has come greater sophistication about what can and cannot be done.

The manpower problems of the nation have had their parallels in individual companies. Indeed, the national problems are, to a large extent, the aggregate of the problems facing individual firms. For some years the problems were those of finding scarce personnel with needed skills; more recently companies have been faced with the necessity for layoffs. And, just as there have been experiments on a national scale aimed at making national manpower planning more effective, companies have shown an interest in developing more effective ways of meeting their manpower needs.

Manpower needs are affected by every aspect of a company's operations. The alternatives for dealing with these needs run the gamut from hiring men with the needed skills to training present workers to redesigning jobs or equipment to eliminate these needs. To plan for manpower utilization effectively seems to require balancing all these variables simultaneously, with the added complication that forecasting events and conditions is a hazardous business at best.

Only a minority of the firms that are interested in better manpower planning say that they have done very much about it. For the most part their attempts have been modest—an effort to tie manpower planning more closely with other business planning, somewhat greater integration of the various traditional personnel activities that affect manpower, a modest extension of the time scale of the planning effort. Where a company has had experience with corporate planning, the efforts have gone further and been more successful than has been the case where planning is a newer venture. But all the companies that have tried to develop better manpower planning systems say that the effort has been worthwhile, even when an unexpected recession has caused them to shift their focus from the needs of the future to the problems of the present.

To provide its Associates with information about this evolving function, The Conference Board undertook a study of company manpower planning activities. Representatives of 84 companies were questioned; in some companies several executives submitted to lengthy and detailed interviews concerning their experiences. To all these participants, The Conference Board is deeply indebted for without their cooperation this report could not have been prepared.

Alexander B. Trowbridge
President

Chapter 1

What Is Manpower Planning?

ONE OF THE PROBLEMS in thinking, talking, and doing something about manpower planning is that the term seems to have so many definitions that for all practical purposes it is undefined. In any given company, manpower planning means whatever the "executive in charge" thinks it means.

A construction firm, for instance, defines manpower planning "as the process of forecasting, both quantitatively and qualitatively, the manpower needs of the company in relation to current and anticipated business needs, resulting from internal and external changing conditions." At the Boeing Corporation, however, a distinction is drawn between forecasting and manpower planning; "forecasting, a line function, is the development of the numbers of employees that will be needed; manpower planning, an industrial relations function, is the development of all the plans to achieve the numbers."

The Lockheed Aircraft Corporation defines manpower planning "as a process that has the purpose of assuring that future manpower requirements are met." Their planning includes all levels and categories of employees. But in the Union Oil Company of California manpower planning activities relate only to the managerial and professional work force.

Even within the same organization executives at different levels or in different functions define the term differently.

A distillation of the various views and definitions yields the following broad definition: manpower planning is a process intended to assure an organization that it will have the proper number of properly qualified and motivated employees in its work force at some specified future time to carry on the work that will then have to be done.

Even with that broad definition, the main thrust of activities carried on in the name of manpower planning varies considerably. The reason? Firms do not engage in manpower planning for its own sake. They do so to deal with some of the vital needs of the firm. Because the manpower needs of different firms differ, so too do their manpower planning activities.

Whatever the activities involved, in retrospect they are not nearly as important as the attention manpower planning focuses upon the essential considerations that will affect a company's manpower in the future. While some planning activities and systems are better adapted to a particular company's needs than are others, the discipline of planning is more important than the system through which it is carried out.

For this study, dozens of small and large companies were contacted to learn about their manpower planning concepts and practices. None claimed to be doing all that it could do in this field. Whether or not any was doing all that it *should* do is a question on which executives in the various firms differed, though most felt that their companies had quite some way to go before they themselves would be satisfied with their manpower planning efforts.

What Is "Manpower Planning"?

The broad definition given above suggests the major activities that are included in the manpower planning function. They are:

Forecasting future manpower requirements, either in terms of mathematical projections of trends in the economy and developments in the industry or of judgmental estimates based upon specific future plans of the company

Inventorying present manpower resources and analyzing the degree to which these resources are employed optimally

Anticipating manpower problems by projecting present resources into the future and comparing them with the forecast of requirements to determine their adequacy, both quantitatively and qualitatively

Planning the necessary programs of recruitment, selection, training, deployment, utilization, transfer, promotion, development, motivation, and compensation so that future manpower requirements will be met.

Spelled out in that fashion, manpower planning is nothing new. Managers have long accepted it as one of their responsibilities to ensure that there would be enough of the right workers on the job when they were needed. Personnel and industrial relations departments have planned for recruiting, training, and other specialized activities for as long as there have been specialized personnel departments.

What is new today is the emphasis being given to extending further into the future the time dimension of manpower planning and to integrating manpower plans more closely with one another and with the other plans of the organization. This emphasis has shown up in the past few years in greatly increased interest in techniques for making manpower projections and in methods for inventorying and analyzing existing manpower and the ways in which it is utilized.

Why the Current Interest?

The reasons for this new emphasis on manpower planning have been well documented in the flood of books and articles on the subject. Some of the causes of this increased interest are fairly recent developments; others have existed for many years but have recently assumed increased urgency.

Technological Change

The myriad changes in production technologies, marketing methods, and management techniques that have taken place in recent years do not have to be listed; everyone who has been working during those years can cite his own examples. Change has been both extensive and rapid, and promises to become even more so. Change in job content and responsibilities is a prospect facing almost everyone who works, and facing every manager who has to see that work gets done. This rapid change in the nature of the jobs to be done is one of the major causes of the interest in more effective ways of planning for the creation and maintenance of a continuously qualified work force.

The Lead Time Needed for Training and Development

With jobs changing rapidly, it has become commonplace for companies to mount extensive training programs to provide their employees with the new knowledge and skills that the new jobs require. Attempts are made to hasten this training time by employing the latest in learning methods and training hardware. Yet for many jobs the training period is unavoidably lengthy, involving on-the-job experience using the new knowledge and skills before true proficiency is attained. This is especially true of the managerial and professional jobs that have become key positions in most organizations. This long lead time needed for development faces manpower managers with the necessity of anticipating their needs for trained men far in advance of the time that will be needed.

Tight Labor Markets

For a variety of skills, the outside labor market has been a less satisfactory source in recent years than it once was. Manpower in many fields has been a scarce commodity. Even periods of relatively high unemployment have not necessarily eased the market for certain skills. This has created a demand for more effective recruiting efforts, which in turn depend upon better information about the types of jobs for which men will have to be recruited. And, where the outside market is overly tight, the need for internal training and its associated manpower planning has been increased. While the situation changed in 1970, executives interviewed believe that soft labor markets will be only a temporary phenomenon.

Demographic Changes

The reasons for increased interest in manpower planning thus far cited have come about in large measure because of changes in the economy. But they have been accompanied and accentuated by changes in the characteristics of the labor force. The low birth rate of the depression Thirties has now resulted in a marked decrease in the adult population aged 35 to 44, the age range from which organizations have traditionally drawn their key personnel — skilled craftsmen, supervisors, middle managers, and experienced professionals. Fewer of these experienced men will be available at the very time that many companies see a future need for more.

Manpower Becoming a Critical Resource

Companies faced with changing job requirements because of technological changes, tight labor markets, and demographic changes in the labor force have concluded that manpower has become as important a factor to consider in company planning as capital, materials, and markets. There are firms that report that they have had to postpone moving into a desirable area of business because they could not get the manpower they needed. There are firms that have introduced new technological methods only to find themselves hamstrung because they had not planned far enough in advance to have qualified employees available. Delays, inefficiencies, and errors traceable to insufficient or unqualified employees are said to be commonplace. Companies are finding that they can no longer expect that they will be able to find someone to do a job at the moment that a job needs to be done unless they have taken steps to procure, develop, and properly utilize their manpower resources.

The Computer and Systems Concepts

At the same time that manpower has assumed the character of a critical resource in many companies, the advent of the computer has provided both an approach and a tool for more intelligent management of that resource. The approach—viewing recruiting, selection and placement, training and development, transfer and promotion, and compensation as part of a total interacting system rather than as separate activities—is not dependent upon the computer but systems thinking has been greatly stimulated by the analysis that accompanies the introduction of computers. The computer itself has at the same time provided a tool for recording the mass of data about employees and manpower needs that relate to a company's "manpower system" and for analyzing the relationships among a variety of manpower variables and other business factors. For example, it has been possible for companies to determine the influence of age, educational background, and organization level on the turnover rates of employees and to determine the effects of technological changes on manning levels. The data from such analyses have made it possible for companies to understand better the interaction of elements of their manpower system and to anticipate with greater precision the probable consequences of changes being made in their manpower management.

Governmental Influences

The Federal Government has also played a role in stimulating companies to become involved in systematic manpower planning, both by example and by directive. The importance the government attaches to manpower planning is shown by the number of government agencies that either make or use manpower projections. They include not only the Bureau of Labor Statistics in the Department of Labor but also, among others, the Department of Agriculture, various agencies in the Department of Health, Education, and Welfare, the Council of Economic Advisers, the Federal Reserve System, the Department of Defense, and the U.S. Employment Service. Manpower projections prepared by these agencies are used by many companies in their own planning. Efforts of these agencies to learn more about the flows of manpower in the country have stimulated companies to undertake their own studies to supplement these government data and relate them to their own needs.

Government agencies have also required firms to supply data on their manpower and their plans for utilizing it. Detailed information on the technical capability of a firm's manpower is required documentation for bidding on many government contracts. To provide the documentation, companies have had to develop skills inventories, which they then have been able to use for their own internal manpower planning.

The current national effort to employ disadvantaged citizens has also played a role. For instance, regulations of the Office of Federal Contract Compliance in regard to the affirmative action programs required of all contractors and subcontractors with 50 or more employees and a contract for $50,000 or more, state that an affirmative action program must include "an analysis of all major job categories at the facility, with explanations if minorities are currently being underutilized in any one or more job categories." In determining whether or not minority group members are being utilized in proportion to their availability, the regulations require that the "contractor will consider at least all of the following factors:

"(1) The minority population in the labor area surrounding the facility,

"(2) The size of the minority unemployment force in the labor area surrounding the facility,

"(3) The percentage of minority work force as compared with the total work force in the immediate labor area,

"(4) The general availability of minorities having requisite skills in the immediate labor area,

"(5) The availability of minorities having requisite skills in an area in which the contractor can reasonably recruit,

"(6) The availability of promotable minority employees within the contractor's organization,

"(7) The anticipated expansion, contraction and turnover of and in the work force,

"(8) The existence of training institutions capable of training minorities in the requisite skills, and

"(9) The degree of training which the contractor is reasonably able to undertake as a means of making all job classes available to minorities."[1]

To supply the required information and to prepare acceptable affirmative action plans, many contractors and subcontractors subject to the regulations have had to develop far more comprehensive and detailed manpower plans than they have ever had before.

Faced with such internal and external pressures, a number of firms have decided that planning for their manpower resource must be as comprehensive and as thorough as their planning for the other strategic resources of the company. Indeed, the manpower planning of some firms is integrated into the planning for the other resources. In the International Business Machines Corporation, manpower plans are a required part of comprehensive division plans. At a heavy manufacturing company, ten-year plans for divisions must include a major section on industrial relations; in addition, manpower implications of planned programs are spelled out in the sections of the plan devoted to the other functional areas of the business.

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[1] "Part 60-2.11 Required utilization analysis and goals" from the Code of Federal Regulations, Chapter 60, Office of Federal Contract Compliance, Equal Employment Opportunity, Department of Labor, as reported in *The Federal Register*, Thursday, February 5, 1970, page 2587.

Few companies, however, have approached the degree of integration of manpower plans with other corporate plans that these companies have achieved. In fact, in spite of all the discussion of manpower planning in recent years, most companies appear to have moved slowly in developing new manpower planning systems.

In the course of this study, line managers and personnel specialists in 84 companies were interviewed concerning their manpower planning practices. Only 24 companies reported anything that they considered to be a manpower planning system. Most of those firms were larger organizations selected for the study because it was known that they had recognized and responded to a need for more effective manpower planning. And, in most of those cases, their manpower planning systems were only about five years old.

Planning for What Future?

Men who have been faced with establishing a manpower planning program say that the imponderables and unpredictables of the future can seem overwhelming at first. They report, however, that the difficulties become easier to face if the future is carefully defined. The actions one will take today to cope with a future manpower problem will differ depending upon whether that future problem will arise next week, next year, or ten years from now. In most cases that also means that the information one needs about that future problem will differ depending upon just what future time one is considering.

Some of the apparent difficulty in manpower planning stems from the unconscious assumption that the goal is to have as concrete and detailed information about manpower needs in five or ten years as one needs to keep the plant running next week. The assumption is fallacious, say experienced manpower planning specialists, and the goal is clearly impossible to achieve in any case.

For manpower planning purposes, "the future" can be segmented into three periods: the short-range or immediate, the mid-range, and the long-range future. None of the three could be spelled out in terms of a set number of days, months or years. The "immediate future" is that period when the exigencies of the current situation almost dictate the action to be taken. Overtime must be scheduled this week to get the rush order out; a replacement must be found for the man due to retire next month. If there has been previous planning for manpower, the plans may serve as a guide in the immediate future. If not, something must still be done at once.

The "mid-range future" has a different time span in different companies. It can be as short as a few months or as long as several years. It is distinguished by the fact that the required manpower actions can be determined from other actions the company has already taken. If a new paper mill is to be built, the manning requirements can be established with considerable accuracy by the time the company is ready to sign a construction contract. Except for a few key managerial personnel, no employee need be assigned to jobs for a couple of years. In the mid-range future, manpower needs can be clearly defined and there is ample time to carefully plan the actions to be taken to fill those needs.

The "long-range future" is that period in which manpower actions are harder to plan because the company has not firmly committed itself to a course of action. It may be considering entering a new field or a new market but the timing and strategy have not been worked out; it may be planning to expand production facilities but not yet have decided whether to enlarge and modernize existing plants or build new ones. Long-range manpower plans must be made on the basis of the company's long-term plans, general trends in the economy and in the labor market, and on long-term trends of productivity in the company. Inevitably, these long-range manpower plans are general rather than specific, flexible rather than rigid, and contain a large margin for error.

Nonetheless, manpower planning specialists say that such plans can be extremely useful in that they identify factors and trends that must be watched for early warning of possible manpower problems to be encountered in carrying out its operating plans. The long lead time provides ample opportunity, they say, to make necessary adjustments and more concrete plans as time slowly brings the long-range future into short range.

Chapter 2

Projecting Manpower Supply and Demand

MANPOWER PROJECTIONS involve two paradoxes. The techniques are basically simple and easy to describe, but applying them successfully may be enormously complex and difficult. And, once the projection has been made, it may prove to be most useful when it proves itself to be least accurate as a vision of the future.

The latter paradox is most easily resolved. If a particular projection points toward a future manpower problem—for instance, a shortage of certain technical personnel essential to a company's expansion plans—the projection may be most useful if it stimulates management to take such actions that the shortage never develops; it can be considered useless only if the problem appears on schedule.

This underscores a point made by all the companies participating in the study: manpower projections are not an academic exercise or an end unto themselves. Their value lies in extending the range of other phases of manpower planning and, indeed, of planning for other company functions. By itself the projection has little value but as part of a total planning process it can be most useful. Just what form the projection takes and what techniques are employed in making it depend to a considerable degree upon the nature and scope of the total planning process and the purposes that it is expected to serve.

Forecasts of manpower supplies and demands are of two types, estimates and projections. Estimates are educated guesses, based on experience with how manpower has been employed in the past and on plans for how it will be used in the future. Projections, on the other hand, are mathematical extensions of data on manpower into the future where the data does not go. Many forecasts involve both projections and estimates. All can have value.

For example, an experienced house painter may know that, working alone, he can paint a two-story house in eight days. He can estimate that with his son helping him they can complete the job in four days. But he may have to make a formal projection of man/days per house times number of houses to learn that he'll need eighty men to complete the job if he wants to bid on a contract to paint a hundred houses in ten days.

Both the earlier estimate of the decrease in working time permitted by the addition of his son to the work force and the later projection of the need for eighty men for his contract were simple to make. Indeed, they may have been too simple for practical purposes. The painter has not examined the many assumptions involved, to see if they stand up.

For instance, the projection of man/days per house times number of houses divided by days available assumes that all the houses are similar to one another and to the houses with which he is familiar. Some may require more painting than others; some less. The projection assumes that supervising eighty men will not be more of a job than supervising himself and his son; no allowance was made for additional supervision. The painter seems to assume that the productivity of the large work force will be the same as that of himself and his son; but the skills of the new men will probably vary and, for the larger job, productivity increases might be possible through specialization of labor or the use of more efficient painting techniques. The simple mathematics conceal a number of possible errors of forecasting.

If our painter was a good manager as well as a good painter, he would examine all the assumptions underlying his projection. He would make estimates of the effects of specialization of labor and of possible new technology on the productivity of his men and alter the projection accordingly. He would look at the management organization needed for the job separately from the actual painters, to determine how many men in supervisory positions might be needed.

Since most manpower planners are concerned with management rather than with exercises, they take considerable pains to find the proper business factors upon which to base their projections, they examine the assumptions that are inherent in the projection methods they use, and they adjust the actual mathematics for the effects of changes in technology, methods, product mix, and the variety of things that can affect the number and types of employees needed to operate the company.

Selecting the Proper Predictor

In making a projection of manpower requirements, selecting the "predictor"—the business factor to which manpower needs will be related—is the critical first step. For a company producing cement, the predictor could be tons of cement. For an automobile company, the factor could be a number of cars and trucks. For a retailer, the proper factor might be dollars of sales.

To be useful, the predictor has to meet at least two requirements. First, it should be directly related to the essential nature of the business so that business planning is done in terms of the factor. If the factor is not projected in the business planning, it would obviously be of no use to project manpower in relation to it. For example, even if manpower requirements relate very closely to units of product produced, that factor would be useless for projecting manpower requirements if all other planning were done in terms of dollar volume and frequent price changes made conversion from dollars to units difficult.

The second requirement is that changes in the selected factor be proportional to changes in the manpower required in the business. The painter used "houses" as his factor on the assumption that the number of painters needed was proportional to the number of houses to be painted. Tons of cement could be used if the number of cement plant workers is proportional to the output of cement.

Selecting the proper business factor may be a difficult job. In many companies the required labor force is not directly proportional to product volume. It may take almost as many men to run a plant at half capacity as at full capacity, though product volume would vary greatly. In that case, it might be necessary to project manpower requirements on the basis of plant capacity rather than on the basis of product volume or plant output.

Further, a single plant may turn out a variety of products, some of which have a high labor input while others require far fewer men to produce. One way this problem is handled is to develop a series of conversion factors that adjust the volumes of the separate products to some common base in manpower requirements. Then total manpower requirements can be projected on the basis of the total of the adjusted volumes for individual products. Of course, some companies make separate manpower projections for the different products; this is especially the case where the products differ not only in the amount of manpower required but also in the types of workers needed.

Some companies attempt to get around the product mix problems by converting volumes to dollar amounts, since sales dollars are almost always included in business planning forecasts. But the introduction of dollars interjects its own problems.

Inflation is one obvious problem requiring companies that use dollar volume to deflate the dollars to some constant value for the period of the projection.

Another problem stems from the costs of purchased goods and services included in the sales figure. A major change in dollar sales volume might well reflect nothing more than changes in the costs to the company of purchased raw materials, components, supplies, utilities, and the like.

Moreover, a changed make/buy decision could seriously distort the manpower/sales dollar relationship. If a company that had been assembling purchased components decided to manufacture the components itself, there might be little change in selling price for the completed product. Thus, dollar sales volume would be little affected by that decision alone. The required manpower, on the other hand, might be vastly increased by the need for workers in the new manufacturing operations.

To get around this problem, while still retaining a factor related to dollar volume, some companies make use of the economic concept of value added. Value added is defined as "that part of the value of products shipped actually created within a firm." Roughly, it is the selling price less the cost of purchased materials and supplies. It reflects the dollar value at internal operations more accurately than does the selling price and thus it is more likely to move proportionately to manpower requirements than is selling price or dollar sales volume.

Dollars also appear in some forecasts as measures of assets invested in plant. This has seemed a useful factor to companies whose manpower requirements seem to be proportional to the amount of plant and equipment employed. A problem appears, however, when investment is made in the modernization of existing facilities. Investment in new facilities tends to increase manpower requirements, but investment in modernization of existing facilities often has the reverse effect as labor-saving machinery is introduced.

Thus the selection of a predictor for manpower requirements can be a difficult task. It requires judgment, knowledge of the business, and a sense of the direction in which the technology employed is moving.

The Standard Oil Company (New Jersey) has found it necessary to select several factors, one for each of several different segments of the work force. Production workers are related to one factor, the sales force to another, management to a third, and the professional work force to still a fourth. As indicated above, it has even been necessary in some cases to make separate projections for production workers making different sorts of products. It has proven necessary to examine the relationship of any significant segment of a work force to any predictor considered in order to determine whether or not a proportional relationship exists between manpower levels and the predictor. If it does not, then that particular factor cannot be used successfully to project for that segment of the work force.

Determining the Historic Relationships

Selecting an appropriate factor is only the start of the projection process. The relationship it bears to manpower levels is what forms the basis for the projection and that relationship must be determined accurately if a useful projection is to be developed.

If the necessary historical data exist, there is little problem. The Boeing Company, for instance, says it has very complete data to use in manpower projection and planning because it has maintained very detailed records of everything it has done on its aircraft programs. It has historical data going back to the early Forties.

Similarly, a large merchandising company has been projecting manpower requirements for over twenty years; the records built up over that period permit it to make quite accurate projections today.

The majority of firms interviewed lack this base. They have only relatively recently become interested in long-range manpower planning and have only begun to build the data base necessary. They report that much information that is desirable for making projections is either completely unavailable or reconstructible only with considerable effort. The lack of adequate historical records on manpower is the obstacle to better manpower planning that is most frequently mentioned by the executives interviewed.

What is needed is a record of the manpower levels associated with the corresponding levels of the predictor factor being used. The company needs to know that it takes 143 men to produce 1,072,543 widgets, for example. It can then convert that relationship to a ratio: approximately 7,500 widgets per man. That ratio, output per man, is what is technically known as "labor productivity."

However, to project the productivity to be expected during the period for which a projection is being made, it is necessary to know the rate at which productivity is changing. For this reason manpower specialists say they need to compute the productivity ratio for at least the last five years, and preferably for a ten-year period in order to determine the average rate of productivity change a company can expect.

To go back to the widget manufacturing operation, an examination of output and manpower figures for the past eight years might reveal marked variation from year to year. But on a trend line, it has been increasing at about 3% annually. If the widget company wished to determine how many men it would need to reach its ten-year goal of producing 3,000,000 widgets annually, it could project on the basis of that 3% annual increase in productivity. Three per cent compounded for ten years is about 34%. In ten years, productivity should be 10,050 widgets per man and the labor force requirement should be 298 men.

Specialists warn that the mathematical average of productivity changes during the five- or ten-year base period should not be used unquestioningly nor should it necessarily be projected into some future period without adjustments. Rather the historical data should be examined to determine, wherever possible, the causes for the changes in labor productivity. The reasons might be found to be the introduction of more automated processes or more efficient machinery, a more efficient production schedule, or some other change that produced an upturn in output per man. The causes might be found in changes in operating levels that brought the plant to a more efficient use of available equipment—the economist's "economy of scale." Whatever the reasons, they should be identified as fully as possible so that it can be determined whether or not similar or equivalent causes of productivity increase can be expected in the future. If so, the *rate of change* in productivity can be expected to remain constant and can be projected. If not, however, some other rate of annual increase in productivity would have to be estimated.

For instance, a chain of retail stores experienced a very marked increase in productivity for sales force when it increased the proportion of part-time clerks employed. The part-time employees were concentrated in those hours when the largest numbers of customers were shopping. By retaining the higher proportion of part-time sales employees the company could expect the average productivity to remain at the higher level it had reached. However, it could not expect that productivity would continue to *increase* as much as it had at the time the change was made unless it knew of other changes that could be expected to have similar effects on productivity.

Thus, before a company can base a projection on the historical average rate of change in productivity, it must have reason to believe that it will be able to continue to introduce new technology and other efficiencies at about the same pace as during its base period. Further, if future plans call for the introduction of some change that is expected to have a dramatic effect upon productivity, the company may have to adjust its projection to reflect the higher productivity that is expected.

For staff manpower specialists, examining productivity records is one of the many tasks in which they need the assistance of experienced operating managers. The staff men can compute the productivity ratios and determine the average rate of change. They can project that change into the future and compute the number of employees needed to reach any desired level of product volume. But where the operator's know-how is needed is in interpreting reasons for past changes in productivity or anticipating future changes.

Not all the reasons for productivity increase can be neatly identified by operating men. Manpower specialists point out that much of the increase can only be lumped under the "learning curve" phenomenon, that is, the common experience that over a period of time operations tend to become more efficient as men learn how to do a job more rapidly and easily. Short cuts of all kinds will be found by workmen and supervisors alike; an operation will be streamlined, supplies will be positioned more conveniently, waiting times between operations will be trimmed, more convenient tools and jigs will be used. All these small changes can seldom be recalled later or specifically related to corresponding improvements in productivity. Nonetheless, in total they add considerably to increased productivity. More significantly for manpower projection, they can usually be expected to continue to bring about more efficient operations, and thus must be considered in projecting the rate of productivity increase.

Staff manpower specialists report that line managers tend to ignore the learning curve phenomenon and to underestimate the improvements that can be expected unless they know of definite plans for new machinery or markedly changed methods from which they expect new efficiencies to flow. Generally, say manpower planning staff men, line managers must be shown the record of steady increases in productivity that can only be explained in terms of the learning curve phenomenon before they will concede that such productivity increases can be expected to continue.

Projections for Particular Groups of Employees

It was noted earlier that some firms build up a projection of their total manpower needs from projections made for specific segments of their labor force. This practice is followed where different labor groups relate differently to various predictors and thus have different productivity ratios. In each case the same process is followed: find the appropriate business factor, draw up the historical record of that factor in relation to manpower employed, compute the productivity ratios, determine the trend, make the necessary adjustments in the trend, past and future, and project to the target year.

However, some companies that could develop projections of their total manpower needs still prefer to make separate projections for different units. The reason is that the different groups of jobs require such different knowledge and skills, require workers with such different characteristics, and are involved in such different career ladders that knowledge of these groups is valuable in itself. The projections are only a starting point for other types of manpower planning; having projections for these various groups makes it easier to plan for them.

Conversely, some firms that develop the total projection directly work from that figure to produce projections for groups that they consider significant in terms of other planning. This is usually done by means of ratios. For instance, a company may discover that there has been a stable relationship between the total production work force and the number of foremen or maintenance men or warehousemen. If the company is interested in projecting the number of these latter groups of workers that would be needed in the target year, and if it has already projected to total production force, it can easily derive the figures needed by multiplying the total by the corresponding ratio. In the only slightly more complicated situation where the relationship had been changing but at a steady and, therefore, projectable rate, the desired information can be obtained by projecting the ratio to the target year and then multiplying by the figure for the total work force. In either situation, the company has developed a projection for the segment of the work force in which it has particular interest.

Projecting Labor Costs

Clearly, projections emphasize numbers of workers. But companies are interested in aspects of the labor force other than sheer numbers. Labor cost is one significant aspect.

In developing a projection of the labor cost to be expected at some future date, companies attempt to develop a trend line for changes in labor costs similar to the trend lines prepared in projecting labor productivity. And, as in the latter case, they examine the major reasons for the changes in labor costs. To learn more about the direction and speed of change, they examine the pattern of wage increases negotiated, the changes in costs for employee benefits, and other such factors. They attempt to determine what changes might occur in the future.

Manpower specialists say that it sometimes seems to take clairvoyance to anticipate all the factors that can affect future labor costs. For instance, firms that employ large numbers of part-time employees sometimes make their manpower projections on the basis of "full-time employees or the equivalent in part-time employees." That can be satisfactory in providing an estimate of the number of workers needed. Some of these firms report, however, that, in early attempts to project labor costs, they overlooked the differential impact that full-time and part-time employees have on the social security tax obligations of the company. The social security tax is levied on wages and salaries up to the point where the current tax base is reached. Only about half of the salary of their full-time employees is taxed, while almost all of the salary of part-time employees is subject to the tax. A statistical "full-time employee" composed of a couple of part-timers might indeed be "equivalent" to one full-timer in terms of base salary and of getting a volume of work performed, but he represents almost twice the social security tax burden on the company.

Projecting Internal Manpower Supplies

For manpower planning purposes, projecting the numbers and types of employees needed at some future time tells only half the story. The manpower supplies that will be available are the other half of the picture that is needed before meaningful planning can be done.

The company's present employees are the base used for projecting its future manpower supply. The employees have known characteristics—age, sex, job level, education and training, quality of performance, possible potential, and location where employed; the company's work force as a whole has further characteristics that are used in projecting supplies, such as the rates of voluntary and involuntary turnover, and the proportion of part-time to total employment.

The simplest projection merely uses the ages of employees to eliminate from the work force projection those who will have retired by the target year. Actuarial tables and company experience can be used to eliminate those who can be expected to have become incapacitated or to have died. Turnover figures can be used to further refine the projection.

As with projecting the need for workers, however, companies have found that they may make serious errors by projecting on the basis of their total labor force. Turnover, for instance, may be concentrated among the lowest age levels of the work force, while retirements will occur only among the older workers. A company that has had a fairly low turnover among employees and a predominantly middle-aged work force may find that its turnover will rise because the workers age to the point where normal and early retirements increase substantially. If they are replaced with younger workers, the voluntary job changes often associated with these workers may act to keep the turnover rate higher than the company had heretofore experienced. Unless this effect of the aging of the work force is anticipated, the projection of the supply of workers

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available internally may be seriously overstated.

The potential for learning new types of work is an important characteristic of the work force for many firms whose experience is that technological change has been constant, requiring some workers to adapt to new methods every few years. If change can be anticipated, a company may record in its personnel files an estimate of the potential of employees and include such data in its projections.

Many firms limit their projections of internal manpower supply to managerial and professional workers. Projections of the numbers and types of managers who will be available at some future date are compared with projections of the number that will be needed in order to anticipate recruiting and training needs.

Projecting the External Labor Supply

Even when a company does not have plans for expansion that can be expected to create new positions to be filled, the aging of its present work force, and other causes of losses, will almost inevitably mean that it must anticipate recruitment and hiring in order to maintain the required work force. When the company plans to expand, even more employee accessions must be anticipated. Consequently, many companies examine projections of the external labor market for those types of workers that will be needed. A few firms make such projections internally, as well as using projections available from outside sources.

The Bureau of Labor Statistics in the U.S. Department of Labor is the most frequently mentioned source of data on future labor market conditions. However, companies also use projections of manpower that are produced by the Engineering Manpower Commission, the National Science Foundation, and the Office of Education and Public Health Service of the Department of Health, Education and Welfare. These organizations prepare projections on the numbers of workers needed in the sciences, engineering, teaching, health occupations, and other specialties. They analyze enrollment in specialized education and figures on the immigration of trained personnel to gauge the future occupational supply.

There are also the projections of supply and demand in localities, by occupations, done by the U.S. Employment Service at the request of the State Employment Services.

Several company manpower specialists stress that it is necessary to examine both supply and demand projections when considering outside sources of workers expected to be needed in the future. The total number of students preparing to enter a given profession may be quite large and seem to ensure an adequate market from which to hire—until the size of the projected demand is set against it. That comparison may reveal an impending shortage in the nation that will parallel the shortage in the company and suggest the need for more widespread, aggressive, and sophisticated recruiting efforts.

One manpower specialist from a midwestern utility told of seven firms that had moved into an area because they had been assured of an adequate supply of clerical workers. The only problem was that each of the firms required almost the entire available supply. The numbers were adequate in terms of any one firm's plans, but not of all. By not anticipating what other, competing, opportunities for clerical employment could be expected to develop in the area, each of the firms had independently made a decision that contributed to a major labor shortage for a community and a serious problem for its own operations.

Communities and companies alike, and the Federal and state governments as well, are finding that they need manpower projections as a starting point for planning to prevent imbalances from arising and for dealing more intelligently with the ones that are to some extent unavoidable. That projections are a starting point for further manpower planning and not an end in themselves is underscored by the manpower planning executives interviewed for this study. "It is the planning that is important," one executive said, "and not the numbers."

In one plant of the Lockheed Aircraft Corporation, projections of the aging of the plant's employees revealed that the number of machinists would drop drastically in a few years. The men were all of about the same age, had been with the company for years, and were approaching retirement age. Plans were made for the eventual recruitment of replacements. The plant personnel men went a step further, however, and began to check out possible recruitment sources in their remote area. They discovered that there were no skilled machinists available, nor were there likely to be any when the plant's needs became acute. As a consequence, the plant developed and now runs an apprentice training program that will ensure a steady supply of skilled men.

In this case, precision in the shortage projection was not nearly so important as the fact that a shortage was predicted, according to the corporate manpower administrator. The projection served to identify a potential problem in time for the company to take steps to avoid it.

The Accuracy of Manpower Projections

The errors in the projections made by the companies studied varied from 2% to over 20%. Some firms have found that they can consistently make even ten-year projections with an error of no more than 3%. Others say they are reasonably satisfied when their projections for two or three years come within 10% of the actuality.

More important, perhaps, than the absolute level of accuracy reported are the reasons given for the variability of accuracy. It appears to be considerably easier for some firms to make accurate manpower projections than it is for others. The differences seem to be related to the "predictability" of the industry, the type of future involved, the quality of the data being used, the degree of integration of manpower planning with other company planning efforts, and the amount of experience the company has with all types of planning.

One of the most important variables is the "predictability" of the industry of which the company is a part. It is obviously more difficult to project the manpower required for a company whose operations are subject to wide swings in response to model changes, styles, or the business cycle. The design and manufacture of women's high fashion clothing, for instance, has been notably geared to frequent fashion changes. For a clothing manufacturer who bets right on a style change, manpower requirements may far exceed his projections; the reverse might be true if his operations are directed toward a style that meets resistance.

A store selling fashions, however, might not have the same experience, even if it guessed wrong, for it could reorder the fashions that *were* selling. Unless women stopped buying clothing, it would need its sales force.

Public utilities are at almost the other extreme from the clothing firm in terms of predictability. One electric utility reported that it already had plans for a new power plant to be operational twenty years from now. Transmission lines or other installations to be built in the interim are designed in terms of that new plant as well as in terms of existing facilities. The community development staff of the utility is heavily involved in activities that result in increased demand for electric power, such as attracting new industry to its area or assisting with the planning of housing developments. As a consequence, the utility is able to project the demand for its product with great accuracy. This, in turn, makes for greater accuracy in its manpower planning. Its long-range projections — for twenty years — have generally fallen within a margin of 5%.

The type of "future" involved in the projection also has a decided influence on the accuracy of the projection. Indeed, for the "mid-range future," when other company plans are already firmly fixed, mathematical projections may not be required. If a new paper mill or steel plant is already on the drawing board, an estimate of the required work force can be developed by experienced operating managers based upon their knowledge of the staffing requirements of similar facilities they have managed. They modify that estimate according to their own judgments of the manpower savings that will probably result from any technological changes being introduced. Unless the other plans change, therefore, the manpower plans can be developed quite accurately.

The "long-range future," on the other hand, extends well beyond the period for which the firm has drawn concrete business plans. A company may have goals for increases in volume, profits, and other financial measures; it may have plans to enter new markets or even new business fields. These, however, are not firm as to details. In forecasting manpower requirements, projections must be used. Projections are prone to greater error, generally, than is the matching of men to a given machine or an already described sales territory.

The accuracy of manpower projections is greatly affected by the quality of the manpower data upon which they are based. Those firms that have maintained detailed manpower records, by age, sex, occupation, location, and projects worked on, have a good base upon which to make projections. Few companies interviewed had such data, at least for the ten years that is considered desirable. Without such records, they found it difficult to make accurate projections.

Even the experience of operating managers is less useful in making projections and estimates in the absence of good manpower records. Many of the staff specialists who mentioned the necessity for an input from operating men also reported that operating managers were likely to make incorrect estimates unless they were working from a base of hard data. Their memories would play tricks on them; the hard data called them back to reality and challenged them to search their memories for explanations of what the data revealed. It is the interplay of manpower data and operating experience that is needed, according to the men interviewed; neither input is adequate in itself.

The degree to which manpower projections and the whole manpower planning process is integrated into a total process of company planning has a bearing upon the accuracy of the manpower projections obtained. Where manpower planning and the making of manpower projections have been carried out by the personnel department in isolation from other company activities, the projections have tended to be off the mark. The interchange of data and information on what has happened in the past in all aspects of the business and what is planned for the future is necessary to accuracy and usefulness in developing manpower projections. Only where the procedures provide for such interchange have firms been reasonably satisfied with their success in projecting manpower needs. Some firms, which had begun to make projections as an isolated personnel activity, report that they had to make it part of the company planning process before they achieved much success and before they could gain acceptance for their projections outside the personnel department.

Finally, the amount of experience a firm has had with planning—both manpower planning and planning for other aspects of the business—has an important bearing upon the accuracy of all the plans. Apparently the adage "If at first you don't succeed, try, try again" applies with special pertinence to making manpower projections. Most of the interviewed manpower specialists report that their first attempts left much to be desired. As they gained experience, the accuracy and usefulness of their manpower projections improved. In part, this was because they discovered additional factors that needed to be included in their projections. They attribute the increased accuracy in large measure, however, to the better data base that gradually built up. As the attempt to make projections reveals the need for data, the company develops records; as the records accumulate, better projections can be made.

The companies that have begun to make manpower projections as part of the total planning process advise that it is important to begin doing so, in spite of the probably justified fears that the projections initially will not be accurate. They can, they say, be useful as warnings of possible problems. By identifying the factors that can have a significant bearing upon manpower needs, the process of making the projections can highlight the crucial events and trends that would signal the need for making changes in manpower or other plans. And by starting to make projections, the company has begun to create both the expertise and the data base upon which it can eventually rely.

Chapter 3

Projecting Future Manpower Requirements

Standard Oil Company (New Jersey)

STANDARD OIL COMPANY (New Jersey) and its affiliates operate all over the globe. They explore for oil deposits, pump them from the ground, refine them into petroleum products, ship them by pipeline, ocean tanker, and truck, and market them to a variety of customers. The company is also in the natural gas business, chemicals, retail service stations, motels, and other fields. And, in remote areas where community services are inadequate or completely lacking, "Jersey Standard" operates schools, hospitals, stores, transportation systems, and other services needed by employees and their families.

Among the 150,000 employees are citizens of over 100 nations representing many cultural backgrounds. They range from laborers with no formal education to Ph.D. scientists working on the far-out fringes of their fields.

As if that were not complicated enough, economic, social, political, and technological developments are constantly affecting the operations of the company, requiring or permitting changes in organization, technology, and manning.

The president of the parent company has said:

"Jersey management is particularly conscious of the fact that the company's ability to achieve its manpower objectives hinges upon the quality of thousands of decisions made at all levels of company operations. I will not be so venturesome as to suggest exactly how these individual decisions can be better channeled toward the desired manpower objectives. But I would suggest that manpower planning may be of considerable assistance. Over a period of years the company has gradually built up an appreciation of the importance of investment decisions and has evolved sophisticated methods for guiding the decision-making process. The company has the same stake in its manpower decisions as it does in its investment decisions. It must begin to devise a comparable approach.

"I do not suggest that the development of a sound manpower planning program will be an easy task. The company is still struggling to master all the intricacies of planning in other areas where this type of activity has a long history. If the experience in these areas is any guide, we can expect some miscalculations and failures in the process of learning to use manpower planning. But the fear of failure is no justification for failure to undertake the task. The final test of the effectiveness of the company's manpower planning effort will be the quality of its manpower decisions, but such a test cannot be made unless we are willing to accept the challenge of manpower planning."

The president spoke these words at a meeting of employee relations managers from the nine regional operating organizations into which Jersey's affiliated oil companies are grouped. The meeting was a workshop called to consider manpower planning and, particularly, techniques for making manpower projections.

During the week, the workshop moved from a discussion of the general nature and purpose of manpower planning to a consideration of the over-all planning process in the company and of the company's manpower planning activities in particular. The international manpower outlook and factors that underlie manpower developments were discussed. There were sessions devoted specifically to techniques for projecting total manpower requirements, deriving from those projections the requirements for management/professional/technical (MPT) manpower, and projecting requirements by occupational families. The forecasting of turnover and techniques for analyzing outside labor supplies were dealt with. Finally, a description of a total manpower planning system and its application to the company attempted to bind together the week's discussions into a meaningful whole.[1]

The president and other speakers recognized that planned manpower activities were being carried out throughout the company all the time. Much of the planning of long-term manpower needs is centered around the corporate outlook statements submitted each spring by the regional operating organizations. Specific manpower planning is continually carried on by the functional coordinating staffs and by employee relations groups at Jersey headquarters, and by operating and employee relations personnel around the world. The purpose of the workshop, therefore, was not to initiate manpower planning within the company, but rather to stimulate more integrated manpower planning through the dissemination of a common group of techniques that each regional organization could adapt to its particular needs and experience.

The company defines the purpose of manpower planning as "getting the right number of people of the right type in the right place at the right time doing the things for which they are economically most useful." To reach that objective, it is said, requires action in four main areas:

> "Employment—which deals with the numbers, types, and quality of personnel hired and their initial placement,
>
> "Human resource development—which is concerned with the training and development of all personnel to maximize their skills and potential talent within the framework of company needs,
>
> "Manpower utilization—which focuses upon the effective use of personnel in terms of the organization of work, the fit between the person and the job, and the individual's performance and motivation, and
>
> "Manpower allocation—which deals with the proper movement and balance of talent through transfer and promotion to ensure the best use of manpower resources within the organization."

However, actions taken in these four areas might well run at cross purposes without an integrated planning process to provide an over-all framework within which decisions can be made on the employment, development, or allocation of manpower. The process must also generate the hard data and reliable projections needed by decision makers when determining the actions to take in the four main areas. This manpower planning process is described as incorporating five distinct steps or stages, each of which is a logical consequence of those that precede it. These five steps are given below.

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[1] In addition to interviews with company officials, material for this chapter comes from the papers presented at the workshop, 166 pages of text plus 115 pages of charts, graphs, and exhibits. Obviously, this brief summary and analysis can only begin to suggest the wealth of material developed by the company on the subject of manpower planning.

The setting of manpower objectives consistent with and in support of the business objectives of the organization,

Manpower audit, an evaluation of the organization's current manpower resources. Its purpose is both to inventory those resources and to determine how effectively they are being used,

Projection of manpower requirements, statements of expectation as to how manpower needs will evolve and how much of the present work force will be available in the future to meet those needs,

Developing appropriate courses of action to correct manpower imbalances in number and utilization, and

Feedback and adjustment of the plans based upon experience.

The making of long-range manpower projections is only one part of the manpower planning process but it is a crucial part and one that is only beginning to be understood. This part of the company's manpower planning activities will be the focus of the rest of this chapter.

Long-range Manpower Projection

In the company's terms, "long-range" projections extend from two to ten or more years into the future. That definition is significant in that it determines the type of information to be included in arriving at the projections. At any given point in time, a company's manpower situation is influenced by both short-term cyclical factors and long-term trends. Both must be taken into consideration in developing plans for one and two years. But short-term swings cannot be anticipated far into the future; long-term projections are based chiefly upon estimates of long-term trends.

The procedure is, essentially, to project into the future a corrected trend in the historical relationship between manpower levels and some pertinent business factor that can be related to future business plans. The secret of useful projections, the company managers say, lies in the skill and judgment used in selecting the business factor to be employed and in making the necessary adjustments and corrections.

Three main sources of information are used, each of which is necessary if useful projections are to be achieved but each of which may present its own special problems for the manpower planner. They are:

Historical data about manpower levels and about the selected business factor and about how both have been affected by changes in equipment and in manufacturing and operating technology, by new products, and by other such factors. In certain cases some of the necessary historical data may be lacking, at least in the form in which it is needed; or it may not cover a long enough period to form a sound historical base for making projections. In such cases the company has had to develop estimates of the needed data from such information as was available.

The corporate outlook that sets the framework for manpower utilization during the forecast period. The selected business factor may not be directly incorporated in the corporate outlook and, again, estimates may have to be made from the factors that are included.

The knowledge of operating managers, whose experience is needed for the proper interpretation of historical data and whose judgments are required in making adjustments in purely mathematical projections of trends. However, it may be necessary to call a manager's attention to possible problems in the data base or in the projections before he can bring his experience and judgment to bear.

Projecting Total Manpower Needs for a Function

The procedure recommended to the regional organizations for making a projection of manpower requirements included seven distinct steps that incorporate the above sources of information. These steps are:

Breaking the function for which projections are to be made into appropriate subfunctions,

Selecting a business factor upon which manpower in a given subfunction depends,

Determining the historical and projected future levels of the selected business factor, Determining historical manpower levels,

Plotting a "manpower coefficient" (a ratio of manpower levels to the business factor levels) and projecting the trend in the coefficient to the target year,

Adjusting the projecting for the influence of special factors, and

Converting the figures to a projection of manpower needs.

Exhibit 1 is a flow chart of this process.

When total manpower needs have been projected through this procedure, the needs for managerial, professional, and technical manpower can be derived from the projection of total manpower and the needs for broad occupational families determined. How this is done can be illustrated best by following through the process as it applies to the refining function.

Determine the Important Subfunctions

Within a major function of an organization there may be subfunctions whose manpower needs respond differently to changes in technology, levels of operation, product mix, and so forth. In that case, it is necessary to project for each of these subfunctions separately. Jersey's criteria for making a separate projection for a subfunction is met (1) if the nature of the subfunction is sufficiently different from the main functional activity and responds independently to business decisions, and (2) if 10% or more of the employment of the over-all function is associated with the subfunction.

In the case of the refining function at Jersey, four subfunctions must be examined to determine which, if any, warrant special handling. They are:

Fuel products, which is the chief activity of most refineries and employs the most manpower. A projection will certainly be made for this subfunction.

Petroleum specialties and packaging, which encompasses lubricating oils, greases, asphalt, etc., tends to respond to different business decisions and factors than the main refining activity. On that basis, a separate projection might be made. However, in some regions the activity employs relatively few men and the effort of making separate projections would not be justified.

Construction, services, and miscellaneous manufacturing seldom employs more than 5% of refinery personnel. The manpower associated with this subfunction, therefore, would be added to the manpower for the fuel products operation and projected as part of that group.

Administration would include refinery coordinating staff personnel at the headquarters of the regional operating organizations as well as direct administrative personnel at individual refineries. Employment in this subfunction is affected by many factors that are not in the picture so far as refinery operating personnel are concerned. Nonetheless, no separate projection is called for because the numbers involved are too small to warrant such treatment.

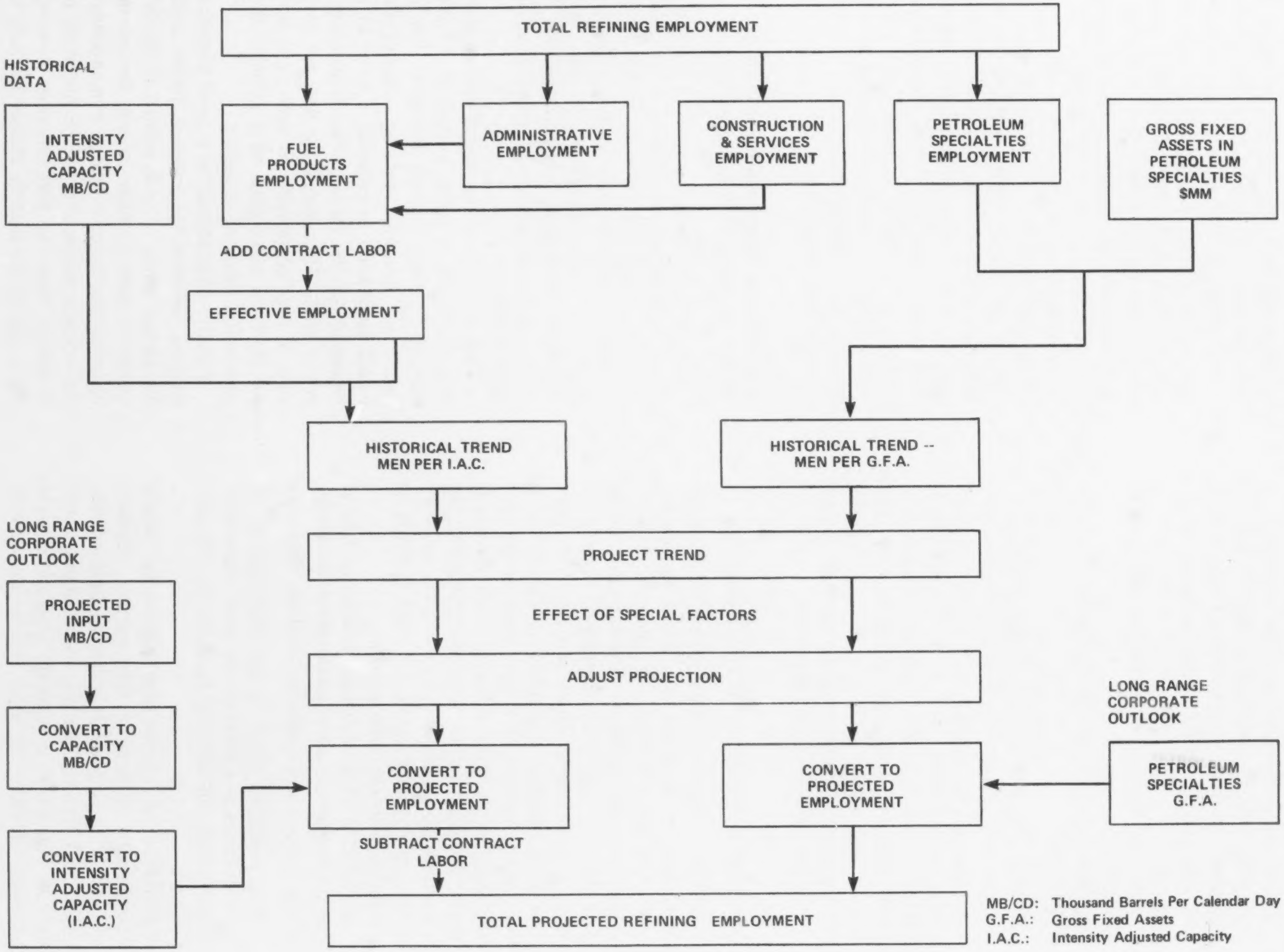
Selecting a Business Factor Upon Which to Base Projections

To serve adequately as a factor upon which to base manpower projections, a business factor must be closely related both to the volume of business operations and to the manpower required for those operations. In the company's experience, finding an appropriate factor can involve testing a number of possibilities against three criteria.

First, there should be logical reasons to believe that the factor is really related to the required manpower levels. Second, historical data on the factor are desirable because without them it would be difficult to establish a trend in the relationship of the factor to corresponding manpower levels. However, if the data are not available, it may be possible to derive the historical pattern from other data or to estimate it within reasonable limits of accuracy.

Finally, there should be a good historical correlation between the selected factor and total manpower levels. This is related to the first criterion; it tests whether or not the reasons for believing the factor is related to manpower levels are actually borne out by the historical record. It differs from the first criterion, however, because any factor that by chance happens to cor-

EXHIBIT 1
Total Manpower Projection Methodology—Refining Function


TOTAL REFINING EMPLOYMENT
HISTORICAL DATA
INTENSITY ADJUSTED CAPACITY MB/CD
FUEL PRODUCTS EMPLOYMENT
ADMINISTRATIVE EMPLOYMENT
CONSTRUCTION & SERVICES EMPLOYMENT
PETROLEUM SPECIALTIES EMPLOYMENT
GROSS FIXED ASSETS IN PETROLEUM SPECIALTIES $MM
ADD CONTRACT LABOR
EFFECTIVE EMPLOYMENT
HISTORICAL TREND MEN PER I.A.C.
HISTORICAL TREND -- MEN PER G.F.A.
LONG RANGE CORPORATE OUTLOOK
PROJECTED INPUT MB/CD
PROJECT TREND
EFFECT OF SPECIAL FACTORS
CONVERT TO CAPACITY MB/CD
ADJUST PROJECTION
LONG RANGE CORPORATE OUTLOOK
CONVERT TO PROJECTED EMPLOYMENT
CONVERT TO PROJECTED EMPLOYMENT
PETROLEUM SPECIALTIES G.F.A.
CONVERT TO INTENSITY ADJUSTED CAPACITY (I.A.C.)
SUBTRACT CONTRACT LABOR
TOTAL PROJECTED REFINING EMPLOYMENT

MB/CD: Thousand Barrels Per Calendar Day
G.F.A.: Gross Fixed Assets
I.A.C.: Intensity Adjusted Capacity

relate well with manpower is not acceptable; there must be some reasonable basis for believing that the correlation is not just a temporary fluke of the data.

When these three criteria are met, the factor selected can serve as a base for manpower projections with some confidence that future changes in manpower will be proportional to changes projected in the business factor. For the refining function, Jersey has examined the adequacy of several possible factors in an attempt to select the most appropriate one for its projections:

Gross fixed assets is deficient as a planning factor because it is distorted by inflation. Variations in land values around the world also distort this as a measure of refinery activity. Finally, equal amounts of investment have different manpower effects depending upon whether they are used for modernization (which tends to reduce manpower needs) or expansion (which tends to create new jobs and increases manpower requirements).

Throughput (the volume of material being processed) is not a good factor because it takes about the same manpower to run a refinery at very different levels of production. Furthermore, refinery processes such as catalytic cracking and hydrocracking are more complex and require more manpower than the basic atmospheric distillation process. Throughput would not reflect these differences in complexity.

Refinery capacity is a fairly good measure because the larger the refinery capacity, the larger would be its manpower requirements—except for the "intensity" of its operations. "Intensity" is Jersey's term for the degree to which the refinery operations involve the more complex refining processes.

"Intensity adjusted capacity" is a composite measure that, as its name implies, takes into account the intensity of the refining operations. It involves as well a recognition of "effective" capacity, that is, the ability of a refinery to produce the type of output required by the market, because theoretical capacity is meaningless if the refinery cannot be run at capacity because the output does not meet customer specifications.

Because intensity adjusted capacity includes the elements of refinery operations to which manpower levels are sensitive, and avoids the distortions caused by inflation, varying land values, and such, it is the business factor recommended by the company's manpower planning specialists as the basis for projecting manpower requirements in refinery fuel products operations.

Determine Historical and Projected Levels of the Selected Business Factor

While intensity adjusted capacity is the best available business factor, its use presents problems because hard data are available only since 1962. The judgment of experienced operating men must be called upon to estimate this factor for enough prior years so that a reasonable trend can be determined. Data for effective capacity for prior years, which are available, provide the base from which such estimates can be made.

Future levels of intensity adjusted capacity must also be estimated because they are not directly projected in the company's long-range business planning; nor is effective capacity. However, total refinery input is projected in the long-range corporate outlook. The headquarters refinery coordination staff states that it is safe to assume that effective capacity will increase proportionately to total input. Refinery operating men can estimate the intensity of future refinery operations from their knowledge of the probable output mix of petroleum products. From these deduced projections of effective capacity and intensity, the selected business factor, intensity adjusted capacity, can be projected. (See Exhibit 2.)

Determine Historical Manpower Levels

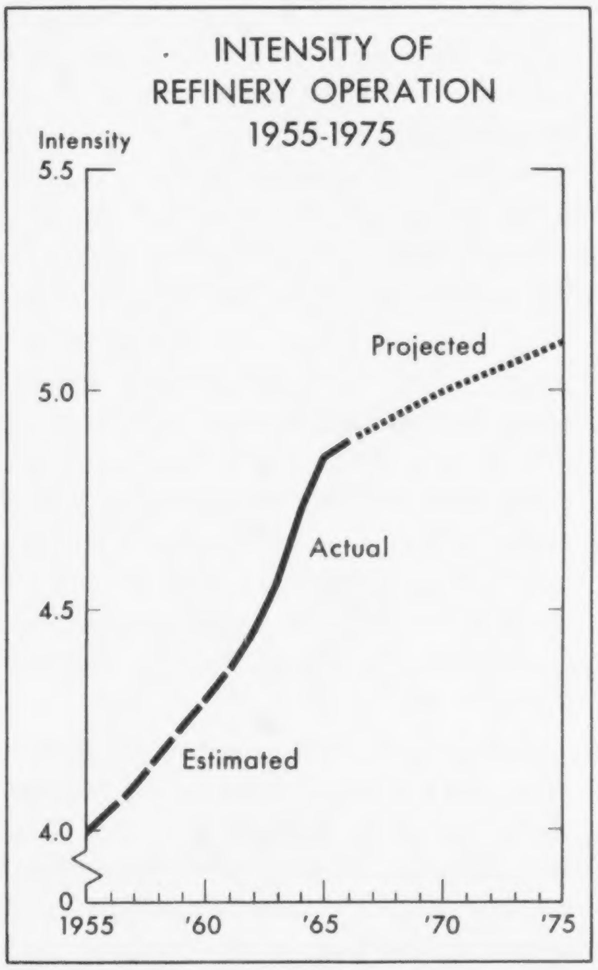
Employment data for the refinery function is readily available in the Jersey company. Some adjustments are necessary before these figures can be used, however. The major adjustment is the addition of contract labor. Like a great many petroleum companies, Jersey uses a significant amount of contract labor at many refineries. While these men are not employees of the company, the work they do contributes to the operation of the refinery. Therefore, they must

EXHIBIT 2
Hypothetical Calculation of Historical and Projected Levels of Intensity Adjusted Capacity

	REFINERY INPUT▲ MB/CD	PERCENT INCREASE OVER 1966	YEAR AVERAGE EFFECTIVE CAPACITY MB/CD		X INTENSITY		= INTENSITY ADJUSTED CAPACITY MB/CD	
1955			408	Actual Data	4.00	Estimated*	1630	Calculated
1956			421		4.05		1705	
1957			424		4.10		1735	
1958			441		4.17		1835	
1959			451		4.25		1915	
1960			453		4.30		1950	
1961			444		4.37		1940	
1962			438		4.45	Calculated	1950	Actual
1963			438		4.57		2000	
1964			421		4.73		1990	
1965			409		4.85		1985	
1966	454		417		4.88		2030	
1970	553	22.2%	510	Calculated	5.00	Projected*	2550	Calculated
1975	654	44.5%	603		5.10		3075	

▲Projected in Business Plans MB/CD: Thousand Barrels Per Calendar Day

*See Chart



be added to the number of employees to get a figure for "effective employees," that is, the number of men required to get out the work.

Plot the Manpower Coefficient; Project to Target Year

The figures for equivalent topping capacity and for effective employment are arrayed for each year in the historical base. The manpower coefficient, which is simply the effective employment divided by the intensity adjusted capacity, yields a ratio of men per thousand barrels per calendar day. These calculations are shown in Exhibit 3.

The manpower coefficient is essentially a measure of productivity. The historical trend at Standard Oil, New Jersey, shows that productivity has increased continuously, that is, fewer men are needed per thousand barrels per day. In making manpower projections, it is the rate of change in this coefficient that is important because the coefficient projected for the target year must reflect the productivity anticipated at that time. Otherwise manpower needs would be misstated.

Adjust Projections for the Influence of Special Factors

There are a number of factors that distort simple projections of trends. While staff manpower planning specialists may be aware of these factors, the *degree* to which they will affect the projections can best be estimated by knowledgeable men close to the scene of operations.

Contract labor, which had to be added to

Jersey employment to get "effective employment," is one such factor. Another is major technological improvement.

For example, a major modernization of an existing refinery causes a fairly sharp decrease in the manpower requirements. If the decrease occurred in the historical base period, it is reflected in a change in the manpower coefficient. However, that same *rate* of change in the coefficient can not be expected to continue once the modernization is completed. That is, the manpower savings are reflected in lower manning requirements but those requirements can not be expected to continue to drop as sharply as they did during the period of modernization. Thus the rate of change in the manpower coefficient must be adjusted to reflect the temporary effect of this special program on the *rate* of change.

On the other hand, if the modernization program is planned for some time in the future, the rate of change in the coefficient has to be increased to reflect the probable increase in productivity that can be anticipated at that future time.

Similarly, operating managers make judgments about the effects of any special programs, changes in product mix, or other factors that either have or will influence manning requirements. If their effects can be judged to be temporary, the projected rate of change in the manpower coefficient is adjusted to discount the influence. If the operating men judge that the effect will be a continuing one, the coefficient trend is not adjusted.

Convert to a Projection of Manpower

Armed with a projection of productivity in the manpower coefficient and a projection of volume in the intensity adjusted capacity, a projection of manpower needs in the target year can be calculated. The calculation is simple. The projected intensity adjusted capacity is multiplied by the manpower coefficient (men per thousand barrels per calendar day of intensity adjusted capacity) to arrive at the effective employment required. The subtraction of the amount of contract labor to be employed in the target year (as estimated by operating managers) yields a figure for the fuel refining employment anticipated at that time.

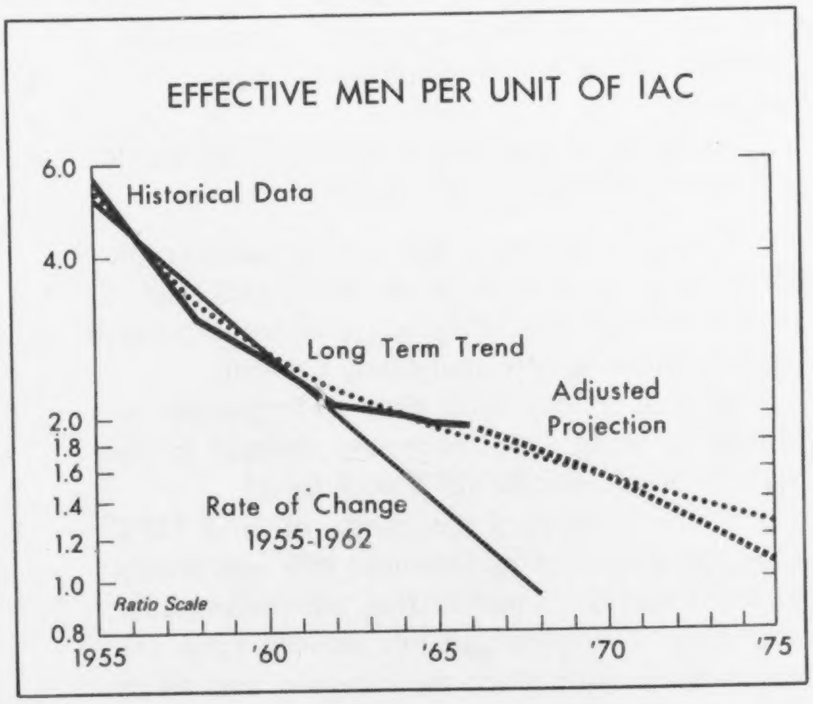
EXHIBIT 3

Hypothetical Calculation of Manpower Coefficient

	EFFECTIVE FUEL PRODUCTS EMPLOYMENT		INTENSITY ADJUSTED CAPACITY (MB/CD)		MANPOWER COEFFICIENT (MEN PER MB/CD/AC)	
1955	9240	Actual	1630		5.66	Calculated
1958	5577		1835		3.04	
1960	5005		1950		2.56	
1962	4077		1950		2.10	
1964	4019		1990		2.02	
1965	3908		1985		1.96	
1966	3940		2030		1.94	
1970	3930	Calculated	2550	Outlook	1.54	Projected*
1975	3380		3075		1.10	

MB/CD: Thousand Barrels Per Calendar Day

*See Chart



Projecting Petroleum Specialties Employment

The projection procedure followed for the subfunction of petroleum specialties and packaging is similar to that described above. However, employment in this subfunction is not closely related to intensity adjusted capacity. Inasmuch as specialized plant and equipment is needed for the various specialties products, gross fixed assets for specialties production is judged to be the best available business factor to relate specialties employment to, and it is that factor that is used in plotting the manpower coefficient and in projecting future employment.

Inasmuch as administrative employment and construction and services employment were lumped into fuel products initially (because the number of men involved was too small to be significant in projecting total manpower), the addition of the projections for fuel products and petroleum specialties gives a projected total employment for the refinery function.

MPT Requirements

The procedure described thus far yields a projection of total manpower requirements. That is obviously a useful planning figure. However, it may be even more useful to obtain projections of the requirements for certain critical segments of the work force. MPT manpower (managerial/professional/technical employees) is one such segment.

The company says that it needs to concentrate on these employees in its planning because:

"First, the company has a very considerable per capita investment in its MPT staff and a sizable part of this outlay is geared to long-term results rather than to immediate pay-out.

"Second, a long lead time is frequently required to bring about necessary changes in the quality or size of the MPT work force.

"Third, because of the nature of most MPT jobs, the quality of performance can vary widely and our success in maximizing this performance can have a very substantial impact upon the effectiveness with which the company uses all its resources—capital and material as well as manpower.

"Fourth, the MPT group represents the growth segment of the work force and it is here where the competition for top talent from universities, government and other companies is most severe. Thus, if the company is faced with any serious manpower imbalances they are most likely to show up in the MPT area."

Jersey weighed two possible approaches to projecting MPT manpower requirements; one duplicates the techniques employed for projecting total manpower, using only MPT employment data in the historical base. The other approach is geared to plotting and projecting the historical ratio of MPT employees to total manpower.

In the main, Jersey follows this latter course. For one thing, it permits the use of much of the material developed in the projection of total manpower, thus saving time and effort on the part of both the manpower planning staff and the operating managers whose experience and judgment must be called upon.

The other, more important, reason for following this approach is that the ratio of MPT to total manpower has shifted within Jersey, as it has within almost all organizations. The changing ratio reflects two concurrent but independent trends: an increase in the managerial, technical, and professional group; a decrease in the number of non-MPT employees required for business operations. The projection of a ratio between these two highlights those changes.

The sequence of steps is similar to those followed in projecting total manpower requirements:

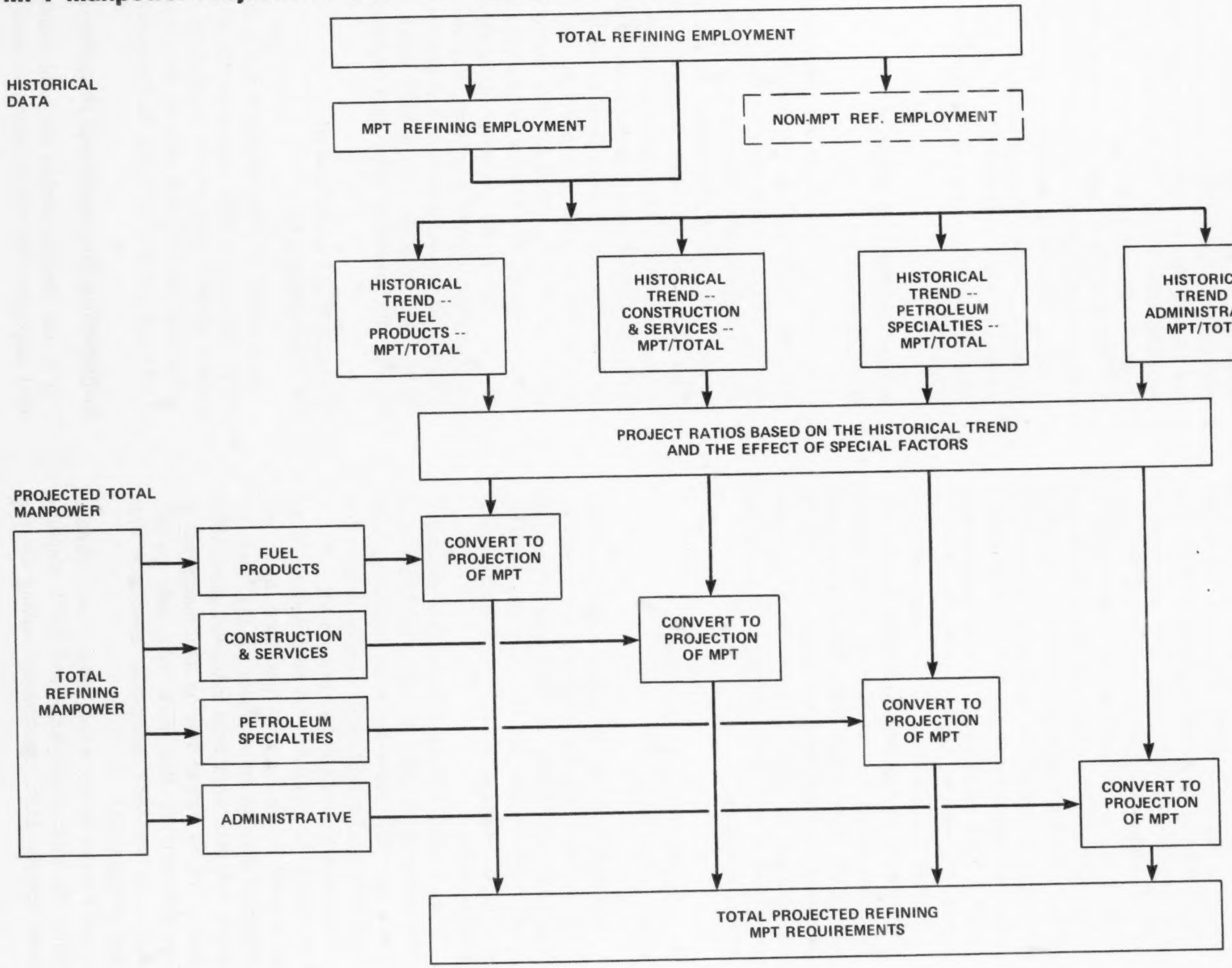
- Analyze major subfunctions
- Plot historical MPT/total manpower ratio and project to the target year
- Adjust the projection for the influence of special factors
- Convert to a projection of MPT employment.

Exhibit 4 is a flow chart of this procedure.

Analyze the Subfunctions

As in the procedure for projecting total employment, the first step in projecting MPT em-

EXHIBIT 4
MPT Manpower Projection Procedure—Refining Function


HISTORICAL DATA
TOTAL REFINING EMPLOYMENT
MPT REFINING EMPLOYMENT
NON-MPT REF. EMPLOYMENT
HISTORICAL TREND -- FUEL PRODUCTS -- MPT/TOTAL
HISTORICAL TREND -- CONSTRUCTION & SERVICES -- MPT/TOTAL
HISTORICAL TREND -- PETROLEUM SPECIALTIES -- MPT/TOTAL
HISTORICAL TREND -- ADMINISTRATIVE MPT/TOTAL
PROJECT RATIOS BASED ON THE HISTORICAL TREND AND THE EFFECT OF SPECIAL FACTORS
PROJECTED TOTAL MANPOWER
TOTAL REFINING MANPOWER
FUEL PRODUCTS
CONSTRUCTION & SERVICES
PETROLEUM SPECIALTIES
ADMINISTRATIVE
CONVERT TO PROJECTION OF MPT
CONVERT TO PROJECTION OF MPT
CONVERT TO PROJECTION OF MPT
CONVERT TO PROJECTION OF MPT
TOTAL PROJECTED REFINING MPT REQUIREMENTS

ployment for a function such as refining is an analysis of the subfunctions to determine whether or not separate projections must be made for each. If the total MPT manpower for a subfunction is not a significant portion of MPT manpower for the whole function, obviously the effort of a separate projection is not justified.

Even where the numbers are not large, however, another factor enters into the determination of the need for a separate projection. Instead of projecting a manpower coefficient, as was done with total employment, this procedure projects a ratio of MPT employment to total employment. Again, the *rate* of change in the ratio is the important consideration. If the ratios of MPT employment to total employment in several subfunctions differ, and particularly if the rate of change in those ratios differ, then it becomes necessary to make separate projections for the subfunctions in order to arrive at an accurate projection of total MPT employment at the end of the procedure.

Plot the Historical MPT/Total Ratio and Project

Where historical employment data in a subfunction exists in sufficient detail, the figures for total employment and for MPT employment are arrayed side by side and the ratios plotted. That is a simple matter of dividing MPT manpower by total manpower.

Until recently, Jersey did not have the necessary employment data in sufficient detail; as a result, the MPT ratios had to be calculated from such data as did exist, with careful examination of the assumptions that had to be made.

One way in which this has been done is shown in Exhibit 5. In the case illustrated, there was historical data on employment for the whole refinery function, both total manpower and MPT manpower, as well as data on total manpower in the subfunctions. But there were only current figures on the MPT manpower associated with the subfunctions.

MPT ratios for the whole refinery were plotted using the total employment and MPT employment figures. Then, consciously making the assumption that MPT ratios for the subfunctions had varied in the past in proportion to the MPT ratios for the whole refinery function, past MPT ratios for the subfunctions were calculated from the current bench mark data, using the simple proportion shown on the bottom of Exhibit 5. Once the desired ratios had been calculated, it was also possible to multiply them by the actual data on total employment in the subfunctions to obtain a reasonable estimate of past MPT employment. In that way an approximate "historical record" of MPT employment trends was developed so that projections of the trends could be made.

Adjust for the Influence of Special Factors

As with the procedure for projecting total manpower requirements, the procedure for projecting MPT requirements calls upon the judgment of experienced operating men at this point to make necessary corrections in the plotted trend of the ratios. If some situation in the past caused a marked (but temporary) change in the trend, the trend line is adjusted to avoid projecting that influence. If some business decision can be expected to alter the trend in the future, adjustment may be called for. For instance, if a refinery organization expects to increase its business in petroleum specialties dramatically, a sharp increase in MPT manpower may be needed to handle the planning and implementation of the expansion. The projection of MPT ratios would have to be changed to reflect that situation.

Convert to a Projection of MPT Employment

Since what has been projected is the ratio of MPT manpower to total manpower, the probable number of MPT employees is obtained by simply multiplying the projected ratio by the projection of total manpower obtained in the first procedure.

Anticipating Occupational Requirements

It is one thing to project the total number of MPT employees that will be needed at some point

EXHIBIT 5

Hypothetical Determination of Historical Fuel Products Refining MPT Employment

	TOTAL REFINING			FUEL PRODUCTS REFINING		
	TOTAL EFFECTIVE EMPLOYMENT	MPT EMPLOYEES	RATIO MPT TO TOTAL	TOTAL EFFECTIVE EMPLOYMENT (ACTUAL)	MPT EMPLOYEES (CALCULATED)	RATIO MPT TO TOTAL
1955				9,240	1,506 ←	16.3
1956				7,612	1,271 ←	16.7
1958				5,577	1,132 ←	20.3
1960				5,055	1,112 ←	22.0
1961	10,238	2,211 →	21.6	4,579	1,053 ←	23.0
1962	9,069	1,895 →	20.9	4,077	905 ←	22.2
1964	8,130	1,809 →	22.3	4,019	953 ←	23.7
1965	7,438	1,743 →	23.4	3,908	969 ←	24.8
1966	7,482	1,785 →	23.9	4,290	1,090 (Actual) →	25.4 (Actual)

$$\frac{\text{TOTAL REFINING (TARGET YEAR)}}{\text{TOTAL REFINING (CURRENT YEAR)}} = \frac{\text{FUEL PRODUCTS (TARGET YEAR)}}{\text{FUEL PRODUCTS (CURRENT YEAR)}}$$

$$\frac{23.4}{23.9} = \frac{X}{25.4} \qquad X = 24.8$$

in the future. It is quite another, and far more difficult, thing to arrive at a reasonably sound estimate of the occupational requirements that will exist at that time. What knowledge and skills will have to be represented among that future work force, and in what combinations? Projecting total manpower numbers does not provide that information. Yet it is the information that is needed for planning recruitment sources, development programs, job and organization designs, and the other aspects of manpower management.

The Jersey organization has not yet found a completely satisfying method for projecting occupational requirements but it feels that it is on the right track. As a start it has developed a system for classifying similar MPT jobs into activities and activity areas.

For the purpose of this analysis, an "activity" is defined as:

"A family of jobs covering various types of responsibility, locations, etc., which require similar kinds of general background knowledge, deal with similar types of problems and information, and call for similar types of skills—recognizing that the degree of skill required may vary with the type of responsibility. There is substantial interchangeability among employees within a given activity in that employees can, within a relatively short period of time, perform most of the jobs of comparable responsibility within the same activity classification about as well as they perform their present jobs."

The Standard Oil (N.J.) classification manual stresses that the activity designation is to be used to describe the type of work in very broad terms so that it may cover the work of numerous individuals. The emphasis is on "the similarities of jobs rather than on the differences." Further, the classification system is intended to describe what an individual actually does, not what he is capable of doing; it is not intended for use as a skills inventory.

Related activities are grouped into broader "activity areas." Some broad areas are not subdivided into separate activities but contain only a single "General" category. For example, the activity area "Corporate Planning" consists of a single category defined as:

> "Formulating, proposing and monitoring corporate objectives. Preparation, analysis and presentation to management of long-range corporate plans including corporate outlooks and financial forecasts. Evaluation of long-range outlooks and plans in relation to expected corporate financial and other results and to corporate objectives. Development of improved methods for measuring corporate performance."

No one job in the corporate planning department involves all the duties listed in the description. However, since individual staff members are expected to handle the whole range of duties as assigned, any further breakdown creates an unnecessary burden.

On the other hand, in a highly specialized activity area such as Petroleum Geology, Jersey identifies fourteen specific activities. For example, "Petroleum Geology-Regional" is defined as:

> "Undertaking of comprehensive studies using geology, paleontology, geophysics and geochemistry involving an entire basin or geologic province. Interpretation of producing potential in sparsely drilled areas."

"Petroleum Geology-Oceanography" is defined as "Performance of studies involving the examination of ocean floor sediments."

To supplement its activity classifications, Jersey has developed a system of manpower categories that identifies the type of responsibility that each MPT job entails. The system subdivides all MPT jobs into five separate groupings: (1) management, (2) supervision of professional employees, (3) supervision of nonprofessional employees, (4) professional, and (5) administrative/technician.

Used in combination with activities and activity areas, the manpower category designation provides a relatively simple way of dividing all MPT jobs into significant subgroups. The Jersey staff believes that the number of subgroups are sufficiently small so that they can be used effectively for analytical and planning purposes.

This method of classifying jobs is already being used by the Humble Oil & Refining Company (Jersey Standard's main operating affiliate in the United States) to analyze the composition of its existing MPT force. The company hopes that managers and professionals, aware of anticipated changes in technology and operating requirements, will be able to use the system in making manpower projections that would be a combination of statistical analysis and managerial judgment of prospective changes for each major activity/manpower category subgroup.

These projections of MPT requirements by subgroups could be used directly in making a wide range of internal staffing plans. In addition, such estimates could be readily translated into a set of hiring requirements for use in the company's recruiting programs.

Development of the classification system has entailed considerable work for the manpower planning staff, but it is considered necessary work. Without sound definitions of the work being done in the company, it had been difficult to arrive at reasonable estimates of how that work might be expected to change over the years.

Projections of occupations/requirements have not yet become a part of the manpower projection work being done by the regional organizations. However, it is thought that the development of the classifications system will now make it possible for such projections to be added to their planning packages.

Variations on the Procedures

The procedures that have been described are those developed by the corporate manpower staff. They are not the only ones used by Jersey Standard, however. The regional operating organizations and the affiliated companies are encouraged to adapt these procedures to their own needs or to develop alternative methods to better fit their own situations. The corporate president has said:

"The main thrust of the company's manpower activity must come from the regional and operating organizations. This viewpoint simply reflects the fact that these organizations are directly responsible for the host of individual objectives. . . .

"Jersey management is aware that it takes time to achieve the manpower results it is looking for. It takes time to get across the importance of manpower decisions to all levels of the company. It also takes time to develop a highly qualified work force. But the company cannot always afford to defer the development of such talent until after the specific needs have been identified. This is a luxury which competition has stripped away. Thus, the company must have advance warning of prospective needs, which must be developed through a system of manpower projections. Such projections are an essential element of manpower planning."

Chapter 4

Manpower Planning in Companies

Companies engage in manpower planning in order to deal more effectively with what they consider their significant manpower problems, and different companies see different problems as being significant. There is, therefore, no uniform pattern of activities that can unambiguously be labeled "manpower planning" and there is no one pattern of organizational ties binding together those managers and functions that contribute to a firm's manpower planning work.

There are a few very general statements that can be made about manpower planning activities and the organization of those activities. First, manpower planning always involves more than one function. Even in the companies that have the most circumscribed definition of what their manpower planning involves, some projections of future need for some categories of manpower are made by industrial relations personnel based upon sales forecasts or growth plans developed by marketing or planning groups. In several companies the corporate planning process includes manpower along with financial, facilities, manufacturing, research, and marketing considerations, and all line and staff groups contribute to the process. In those cases, there is no manpower plan as such; rather there is an over-all company plan with a host of specialized provisions for the contribution each function must make in support of it.

In several companies with fairly elaborate planning procedures, a planning unit is established to coordinate and control the planning process. The steps of the process and the points at which inputs are required from various units and functions had been clearly spelled out. Some of the larger companies have formal planning units at division levels as well as a corporate planning unit.

Where a unit has been charged with responsibility for manpower planning (however defined), the unit is located in the personnel or industrial relations function. Usually, the unit with the manpower planning responsibility is also involved in such other activities as development or recruiting or staffing. In companies where its responsibilities are exclusively "man-

Smaller Companies

During the course of this study, representatives of seventy moderate-sized and small companies were interviewed concerning their manpower planning activities. The firms ranged from a manufacturing plant employing forty men to a utility employing almost a thousand. In all but a dozen companies little specialized manpower planning was being done.

In most cases, this was explained as being due to the need felt by small firms to respond to immediate pressures. It is the nature of their businesses to constantly be putting out fires. Indeed, the small firm's ability to respond rapidly to changing situations was cited as the major advantage it holds over a larger one. The managers of small firms felt that they would be sacrificing some of this flexibility by planning very far into the future.

Furthermore, these firms do not have the specialized staff that most of the interviewed managers consider necessary for any sort of systematic planning. They said that the priorities they had to give to immediate problems prevented them from giving enough time to developing that capability.

That this rationale may itself lead to business problems is illustrated by the experience of a small dairy serving the suburbs of a major city. One of the major contributions to the firm's profits was the sale of its cottage cheese, which was particularly good and found wide customer acceptance in its locality. The process for making the cheese was known only to one man. He refused to divulge his secret to anyone else in the firm because, he said, he had been laid off by another firm in the depression and he considered keeping his secret a hedge against that happening again.

At various times the owner had tried to persuade the cheese maker to reveal his secret, offering various incentives. These efforts were not really pushed, however, because the cheese maker was only in his early fifties and there seemed to be no immediate problem. Then this key man died of a heart attack.

While the dairy continued to make cottage cheese, it quickly lost most of its customers. The new product was just not the same. Profits dropped sharply. In the two subsequent years the firm has not returned to its former profit level. The loss of its key "manpower" has been the most serious problem it has faced in years.

Several personnel managers from these smaller companies felt that their firms were similarly vulnerable to serious business problems growing out of the loss of key manpower, either from death or resignation. Their management and professional groups are spread so thin that they do not have backup men for many key employees.

In the few smaller firms that have undertaken systematic manpower planning, either one of two conditions or both exist—the firm has undergone rapid, almost chaotic, growth, or the firm has a young chief executive with formal business training.

In one company both conditions exist. It was founded five years ago by a young man who had just graduated from business school. The firm employed a total of fifty persons and produces posters and other psychedelic materials. Its growth was slow at first, but about two years ago it expanded to 400 employees in six months.

The company's president, wishing to avoid the feast-or-famine experience of many small companies, decided that the company would have to be managed in a systematic fashion. He has reorganized to rationalize management responsibilities and has instituted a formal long-range planning program. The firm now plans its business operations, including the manpower requirements, five years into the future.

Another company, a regional supermarket chain, is growing rapidly. In 1970 it had fifty stores and planned to add thirty more during the course of the year. Manpower requirements are part of its expansion plans. The personnel manager explains that there is little difficulty in making accurate estimates of needs because the stores are essentially duplicates of one another. Therefore, each store can be considered to require so many people, each three stores to require one territory manager, and so on. Knowing when, and how many, store and territory managers would be needed, the firm can select potential managers from among its present employees and give them the needed experience in managerial responsibilities.

In this case, too, the president is a young man with formal business training. The son of the founder, he took over the reins of the company and instituted many of the more systematic management practices that he had been taught. He feels that they are particularly adaptable to smaller firms because the elaborate procedures that may be needed to make them work in a very large organization can be vastly simplified in the smaller company. The specialized knowledge required, he says, is not so great that men can't quite easily pick it up, provided there is the desire to make use of these methods.

power planning," with other departments concerned with development, recruiting, and other personnel activities, the manpower planning unit is generally a rather new one, about five or six years old.

Projections of manpower needs are not always made by the unit called "manpower planning." They are often made by corporate planning, the controller, or by line managers in the divisions. However, the formal manpower planning unit usually has the responsibility for developing the projection techniques that are used as well as the hard data on such factors as turnover, retirements, trends in manpower utilization that are fed into the manpower projections made by others, particularly when those projections are made outside a "personnel" unit.

Where the planning procedure has become quite elaborate, several corporate staff groups may play a role in developing a set of assumptions that must be used by divisional personnel in developing the plans that will later be submitted to the corporate officers. In addition, these corporate staff groups may have the responsibility for reviewing and commenting upon, or even giving approval to, sections of division plans that deal with their respective functional areas before they can be submitted to the corporate officers.

Finally, the unit with responsibility for manpower planning spends most of its time in a variety of activities not directly related to the development of corporate manpower projections. As noted above, some have other responsibilities such as management development. Even where manpower planning is the sole responsibility, however, the analysis of special manpower problems takes up most of the working time of the manpower planners. The units have usually been established to assist in making projections of manpower needs as part of a long-range business planning process, but manpower analyses have usually proven to be so useful to personnel and operating managers that these become an important part of the manpower planners' work.

Even these generalizations are hazardous, however, because the work of the manpower planning unit in most companies is in a state of flux. The unit is so new, the function is in such rapid development in the firm, that change in the organization and in what it does is constant. What manpower planning is and what manpower planners do can best be seen from a review of the process in several companies.

Hewlett-Packard Company

Hewlett-Packard Company is a manufacturer of high-precision instruments. In the lobby of the firm's headquarters is a clock that would take 3,000 years to accumulate one second of error. The company has 17 plants in the United States and one each in Scotland, Germany, and Japan. It employs 15,600 people worldwide and almost 13,000 in the United States; 17% of the U.S. personnel have degrees.

New or improved instruments are given great emphasis. New projects are developed by small teams with a high degree of autonomy; one man may develop an initial idea for an instrument, test the market acceptability of the idea, design the instrument, build the prototype, and do everything needed up to the point at which it is turned over, as a finished product, to the manufacturing organization. In this company a twenty-man development team is unusually large.

The strength of the company lies in its professional work force, and therefore the company's manpower planning efforts concentrate on that segment of manpower. Since 1965 the corporate planning and development department has attempted to make projections of the total professional work force needed as a guide to the recruiting effort. Thus far the over-all corporate projections have been within plus/minus five per cent of actual requirements, but the corporate professional staffing manager says that, for individual divisions, errors have sometimes been considerably greater.

The manager developed a set of ratios of employees to sales dollars for the various functions and for different levels of employees. He uses these ratios to project manpower needs in relation to the company's long-range plans. The company has not been using the ratios long enough to evaluate fully their usefulness as a planning tool, but they are considered at least a useful starting point.

The company's long-range plan is developed by the corporate planning and development department, a group with an economics orientation. They prepare five-year, one-year, and six-month plans on a continuous, rolling basis, updating the plans every six months. The plans are based upon an economic analysis of the state of the economy generally and of the instruments industry specifically, on the research and development work underway in the firm, and on reports of sales targets from the various divisions and estimates from the field sales forces. The plan does not currently include manpower estimates.

There is no organizational tie between the corporate planning and development staff and the corporate professional staffing manager. The long-range plans are the base upon which manpower projections are made but that is the extent of the relationship.

The principal purpose to which projections are put is planning the firm's college recruiting effort. This effort is mounted by engineering supervisors, division general managers, and other line technical men who can talk knowingly about the work that a graduate will do in the company. Recruiting begins each year before the date on which the formal plan is finally approved by top management. Thus the projections of need form a useful base for the start of the recruiting effort, although the hiring targets may have to be modified on the basis of the plans that are finally approved.

Analysis of the needs of the firms by function and level has had impact on hiring beyond the numbers of men employed. There has been an increased effort to find men with both an engineering and a business degree—"management science types"—whereas formerly the company often concentrated more upon men with technological backgrounds alone. The manpower studies showed that the company would need more men who could use advanced techniques in solving management problems.

The principal problem in the manpower planning activity thus far has been the meager data base, according to the professional staffing manager. A more detailed skills inventory is being considered and a more accurate appraisal program is being introduced. The resulting data will make possible a better analysis of the present work force and its abilities and, coupled with manpower ratios, is expected to permit even more accurate and useful manpower planning in the future.

3M Company

The 3M Company has been involved with manpower projections since 1954. These projections form a basis for the employment department recruiting forecast, the management manpower plan of the organization and development department, and the annual budgets prepared by the controller's division. Each of these departments prepares a separate forecast designed to fulfill its planning needs but all are coordinated so that there is no disagreement in goals or management plans. All three are parts of the over-all guidelines that enable 3M to recruit, train and develop adequate numbers of employees at all levels to staff its continually growing operations properly.

The close communication about, and coordination of, these separate projections is made easier by a circumstance at 3M that is true of few other equally large United States concerns. While the company has 26 domestic divisions, 9 domestic subsidiaries, and 42 overseas subsidiaries, 80% of its 2,100 domestic managers and professionals work in a single facility at its suburban St. Paul headquarters. As one man said, "We can't help but know what is going on throughout the company; we see each other all the time."

Projecting Salaried Personnel Requirements

One element in the manpower forecasting process involves projections of hiring needs for salaried personnel. This is done by the employment department, one of five departments in the corporate personnel function. The employment department has the responsibility for hiring salaried personnel nationwide. So that a better recruiting job could be done, the director of the department attempted in 1953 to find a method for estimating hiring needs at least a year in advance, rather than relying upon personnel requisitions to spell out these needs as they developed during the year.

To find a basis for projecting the needs, he planned to experiment with a number of possible ratios: personnel to sales volume in dollars, personnel to units sold, and various other relationships of manpower to business activity. However, he obtained such good correlations with the first relationship examined, of personnel to sales dollars, that he has used it, with refinements, ever since.

Projections are made for five major groupings of manpower: administrative employees, nondegreed technicians, technical employees (degreed), engineering and manufacturing, and sales employees. The ratio of technical employees in the laboratories and those in the engineering and manufacturing division differ greatly, necessitating the separate forecasts for technical recruitment. This also coincides with the budgeting divisions used by the controller.

The method of calculating the projections is simple. All the work can be done on a single sheet of paper with a pencil. The ratio of manpower to sales for the last three years is determined for each category and the trend in the "improvement factor"—the productivity increase—is noted. While the improvement factor differs for the five groups of employees, for any one group it has maintained a consistent curve over the years.

The amount of domestic sales forecast for the coming year is divided by the new manpower ratio for that year. The result is the total manpower expected in that category at the end of the forecast year. Deducting the current manpower leaves the additional manpower to be recruited during the year. To this figure is added replacements needed for employees who have separated from the company, determined from a turnover study done quarterly.

Managerial judgment must come into play in making adjustments to the figures and in interpreting the projections. For example, in some years not all the requisitions for laboratory personnel have been filled by year end. These unfilled but needed positions have to be added to the manpower figures in deriving the manpower ratio so that the subsequent projection will accurately reflect needs and not just current inadequate staffing. Similarly, contract engineering has become a significant element in the work of the engineering function. These nonemployee engineers doing work for 3M must be added to the 3M employees to get an accurate figure for the company's engineering manpower needs. The projection can then reflect those needs; the managers of the engineering function can determine whether they will fill them by hiring new employees or by contracting out the work, or both.

Projection of the manpower needs for 3M's sales force is especially difficult, according to the director of employment. The work of dealers and their employees has considerable effect on 3M sales. There is no simple formula for determining how much allowance to make in the projections to account for these non-3M people.

Thus the mathematical exercise of computing the ratios is only the starting point for computing the manpower needs. By itself, the mathematics is pretty worthless. A computer company found that out a few years ago when it tried to adapt 3M's technique and program it into a computer. It didn't work. The mathematical projections presented no problem but the judgments required in making the necessary adjustments in the mathematics just could not be written into a program.

At 3M, manpower projections are made during the budget preparation period in the fall of the year. Sales forecasts for the divisions and for the company as a whole are one input. The corporate controller uses these figures for his projections of total company manpower. However, the controller also issues figures on year-end employment for the last six years and these figures, together with the sales forecasts, are used by the director of employment in making the more detailed projections for the five categories of salaried personnel.

All laboratory and engineering department heads report their estimates of the number of new college hires needed, by degree and field of study, to the college relations personnel in the employment department. These figures serve as a cross-check on the manpower projections. The totals of these estimates usually agree within one or two per cent with the figures for graduates derived from the projections process.

Needs for Managerial Personnel

A separate projection of managerial manpower is made by the manager of organization and manpower development. Two manpower ratios are used for this projection: the total number of employees to world sales in dollars and the number of managers to total employees. As with the ratios used in projecting new hires, the ratio of managers to total employees is expected to show an annual "improvement," at least in the company's domestic operations and in the older, established overseas subsidiaries. It is accepted in the firm that a new subsidiary overseas may have to operate for some time with a higher ratio of managers to total employment than will be permitted once the operation has had time to shake down.

The projection of managerial manpower needs is tied into sales forecasting at both the corporate and divisional levels. Short-range forecasting is done for one year; long-range planning is done for several years leading to the goals for a given target year. That is, contrary to preparing a long-range plan for some stipulated period of years into the future, and adding a new future year annually, 3M has picked a target year in the future (currently 1973, selected in 1966), set goals for that year, and annually monitors to maintain progress toward those goals. A projection of the managerial manpower requirements for the target year has been made. The annual projections prepared as part of the forecasting process are compared with the target year needs to ensure that an adequate number of men with the requisite skills is being added to the work force so that the goals for the target year will be met.

To use managerial manpower as a growth resource, the company has to have information about the quality of the resource. In addition to a formal appraisal and "estimate of potential" program, the biennial "manpower review" is the mechanism the company uses for that purpose. The manager of organization and manpower development meets with the functional managers in the divisions to get their oral impressions and ratings of the men in their functions—who is ready for which jobs, what developmental experiences are needed by which men, what reassignments are planned. These appraisals are reviewed with the division general manager and his group vice president. Then the president and the chairman of the board review the whole managerial force and the adequacy of the plans made to maintain and improve the competence of the men who make it up.

Of course, projecting manpower requirements, whether in terms of new hires or of managers, is not a once-a-year job. The manager of organization and manpower development, the director of employment, the corporate controller, and the various operating managers are in frequent contact. The director of employment routinely checks twice a month with the controller to determine whether or not sales performance is matching the projections; when things are changing rapidly he checks even more often. Thus he can make adjustments in the recruiting and hiring activity to bring it into line with the company's changing needs.

The manager of organization and manpower development similarly monitors inventory searches for filling managerial jobs and all new manager appointments. Quarterly he checks the rate of additions to the management team, management turnover, and the impact of any reorganizations on forecasted requirements. At least annually he reviews his current supply and demand analyses with each division's management group, providing them with feedback on how well they are meeting their own needs and forecasts.

3M's managers say that their approach to manpower planning may not be scientific or sophisticated but that it is systematic—and it works.

The Bell Telephone System

The Bell System provides telephone service. While the companies that make up the system also provide other communications services and are engaged in a variety of research and manufacturing operations, they are essentially in the telephone business. That fact determines many of the characteristics of the operating procedures and management methods of the individual companies.

A telephone installed and maintained by any one of the operating companies has to be able to connect with any other telephone in any part of the system and, indeed, with any other telephone in the world. That requires not only that equipment be technically compatible but that operating methods be coordinated. While management methods in nontechnical areas may vary among the companies in the system, there is a tendency for practices to be similar throughout the organization.

The personnel manager at the American Telephone and Telegraph Company, the parent organization, described the usual manpower planning practices of the operating companies; he cautioned, however, that the practices vary in some of the constituent organizations.

Each operating company is organized into about a dozen major departments, such as the plant department, which installs and maintains telephone equipment; the switching department, which handles central office work; the commercial department, which provides customer relations services for customers using two lines or less; the marketing department for large customers; and the personnel department. In most of the companies manpower planning is done departmentally. Only in a few of the smaller companies is the manpower planning work done on a company-wide basis.

Detailed planning in the companies is always done for at least five years into the future and often for ten. The basis for the planning is the construction budget. This budget is reviewed and adjusted quarterly and is prepared for the current year and into the future for one, two, three, five, and ten years. With some exceptions, it is generally possible for the company to budget for long periods into the future with an accuracy of plus or minus five per cent because, like most utilities, it can usually foresee the need for expanding its services to customers. It estimates the new equipment going into customers' hands and the central office equipment needed to handle the expanded loads.

Past experience is used to estimate the number of personnel needed in the various departments to handle the anticipated loads. That past experience has to be modified on the basis of changes both in productivity and in equipment.

The AT&T personnel director says that the manpower planning activity of operating companies has not been really well integrated into their business planning. However, this is expected to change because the operating companies themselves have been giving greater emphasis to the development of integrated systems that would tie together the planning for all aspects of their operations. The parent company has encouraged this new emphasis but has not issued corporate directives mandating new planning ventures.

The personnel director at corporate headquarters has been working with his counterparts in the operating companies to develop a common model for manpower planning. He believes that to be truly useful to the companies, the planning model must include provisions for:

- A comprehensive management inventory by organization level to determine the profile (age, education, experience, special skills, and interests, etc.) of the current force
- Forecasts of needs for new employees, by skill and experience categories and not just total numbers
- Identification of craft people with potential for management jobs
- Training programs and other developmental experiences to update people technically and in management knowledge and skills
- Programs for appraising the performance of managers, with separate programs for appraising their potential to take on larger responsibilities
- The identification of career development paths for management personnel.

The operating companies are already engaged in many of these programs and activities, assisted by personnel staff groups at AT&T. In most of the companies, however, the programs have not been integrated with one another, nor has a particular program in any one department within a company necessarily been tied into a comparable effort in any other departments. What is needed, according to the AT&T personnel director, is the integration of all these separate activities into the total planning process for a whole operating company. That is the direction in which the Bell System's manpower and other planning efforts are moving. While the individual companies are expected to develop integrated planning programs that differ in detail, AT&T is convinced that the result will be the increased planning capability that the times require.

Scott Paper Company

For most of its history the Scott Paper Company has been a highly centralized organization engaged in the manufacture and sale of paper products. That isn't true today. In 1967 Scott began a program of diversification, divisionalization, and decentralization that has reshaped the company. While the bulk of its operations and the greatest share of its profits still come from the Packaged Products Division (the "old" Scott Paper Company), the firm is also a manufacturer and marketer of printing, converting, and other papers, educational audiovisual materials, high quality indoor-outdoor furniture, microfilm processes for information technology applications, and plastic coated materials, and a host of other products. Scott is also developing commerical recreation areas in its forest lands.

The manpower planning needs of the Scott Paper Company seem to be changing, but the dimensions of that change and the proper response to it look different depending upon whether one sits at the corporate level in the new company or deep within the division that was the whole company a few years ago. That is a situation common in any company that has undergone the change in orientation and organization that Scott has experienced in the last three years. And, as in other such companies, the solutions to the problems of developing a manpower planning process appropriate for Scott are being worked out by the managers at both division and corporate levels.

The company as a whole employs about 22,000 people, of whom about 4,500 are managers. The Packaged Products Division employs about 13,800.

Scott has engaged in long-range corporate planning for about twelve years. For many years detailed plans for the recruiting, deployment, training, and development of manpower have been made on the basis of estimates of manpower needs. But just as the organization of the company and its fields of business have changed in recent years, so too have its needs for manpower planning.

Planning in the Packaged Products Division

The industrial relations vice president of the Packaged Products Division says that "the rationale for manpower planning grows from the question: 'Is there a problem?' " What manpower planning is depends on the answer to that question. He explains, for example, that the division has never experienced a problem in obtaining either production workers or salesmen, so there are no long-range plans for recruiting these employees. On the other hand, there are plans for the steady recruiting of MBA's, engineers, and accountants, who have been hard to obtain until the past year.

The division forecasts its manpower needs for two years beyond the current year. Estimates are made in several categories: trainees, administrative or supervisory management, middle management, executive management, clerical/secretarial employees, technicians, and hourly employees. Division executives say that there is no real validity to estimates beyond two years but that, on basis of past attempts, they have concluded that they can be quite accurate for that period. Trends in the firm's markets can be seen pretty clearly for two years into the future, and the manpower effects on new developments within the company can be gauged with considerable accuracy by the operating and staff managers. Exhibit 6 shows the form of these manpower estimates.

For categories of employees who are hard to find when needed—where the division "can't respond just by hiring new men when an opening occurs"—the division has on occasion hired over the allowance in the manpower budget so as to have them on hand. Mechanics and technicians, for instance, have at times been hired in excess of immediate requirements.

For accountants, engineers, and men with graduate business education the division has mounted special recruiting programs, developed trainee positions into which to hire them, and made other special efforts in order to have sufficient reserves of men with these key skills.

Division executives see several strings in their manpower planning bow. The division does considerable training, and the training programs are planned in terms of manpower needs. The management-by-objectives program is considered to be, in part, a manpower tool because managers set objectives in the manpower area when the needs for their operations so dictate. The company's job evaluation system for managerial and professional positions is considered a part of the manpower planning program because the analyses and reviews by division and corporate staff help to make more rational the relationships among job responsibilities and to avoid duplicate work.

The division has undertaken career path analysis for sales and marketing personnel, gathering and analyzing data on the length of time men normally remain in various positions and the paths they follow when transferred or promoted. This data permits the division personnel managers to spot men who are making extraordinary progress and see that they are given the experience and continuous challenge they need. It is also possible to spot men who seem to be moving too slowly so that the causes can be found and efforts made to help them in their careers.

All of these programs are considered to be part of the manpower planning effort of the division. But within the division, there is now a new emphasis on tying all the separate pieces together more closely than in the past.

Coordinating the Manpower Planning

To achieve this greater integration, the division has developed a long-range planning strategy, a sequence of analysis and planning. First the strategy requires the identification and testing of "environmental assumptions." For instance, the question would be asked: "What influences now or in the future might arise outside the company that could affect the external supply of men with the skills we need or that could affect our internal manpower?" The answers to questions such as that provide a backdrop of assumptions for further planning.

The next step is an analysis of the division's manpower strengths and weaknesses in terms of the environment in which it will be operating. To capitalize on the strengths and to offset the weaknesses, the division develops both long-term and short-term objectives, for example, an objective to employ more minority group members and women in supervisory, managerial, and professional positions. Finally, strategies for achieving the objectives are laid out; for instance, increased recruiting at women's colleges and colleges with large numbers of black students.

Until now, the closest the division has come to such closely integrated manpower effort occurred recently in connection with planning for a new manufacturing facility. Then the planning, including the manpower planning, was "unbelievably refined." The plant manager and his key subordinates, among them the plant personnel manager, were appointed several years in advance. Every detail of the plant and its operation was gone over in detail. In terms of manpower, for example, they have developed plans for the numbers of employees and the functions they would perform, the skills they would require, the salary and wage rate structures that would be established, and the probability of union representation of the employees.

Even in the event of a new paper machine being added to an existing mill, there is a period

EXHIBIT 6
Staffing Forecast

STAFFING FORECAST * FOR: ______________________ ORGANIZATION DATE: ______________

	ENTRY OR TRAINEE			ADMINISTRATIVE AND SUPERVISORY MANAGEMENT		MIDDLE MANAGEMENT		EXECUTIVE MANAGEMENT	CLERICAL/ SECRETARIAL	TECHNICIANS	HOURLY	EXPLANATION **
JOB EVALUATION POINTS	UP TO 220	221 TO 285	286 TO 375	376 TO 485	486 TO 630	631 TO 820	821 TO 1065	OVER 1065				
1970 ACTUAL CURRENT												
1970 BUDGET												
1971 PROJECTED REQUIREMENT												
1972 PROJECTED REQUIREMENT												
NET CHANGE VS. 1970 BUDGET												

**ADDITIONAL EXPLANATION OR COMMENTARY (CONTINUE ON BACK OF FORM IF NECESSARY):

*BASED UPON ORGANIZATIONAL NEEDS TO MEET PLANNED BUSINESS OBJECTIVES OTHER THAN NORMAL TURNOVER AND RETIREMENT REPLACEMENT of several years during which manpower plans can be made and implemented. There is plenty of time, say division managers, for the men on the job to train employees and upgrade them for new jobs and to recruit replacements for the men who have advanced.

The Packaged Products Division, which until a few years ago *was* the Scott Paper Company, finds that it must refine the techniques it has been using successfully for many years. But at the corporate level of the company, however, new and different needs seem to be emerging.

The Corporate Planning Perspective

For one thing, at the corporate level, the two-year estimates that the division has found adequate don't seem to go far enough into the future. It is thought that manpower estimates should be keyed to the five-year, long-term business plan. That plan, developed by profit center managers, requires estimates of business volume in the profit center's "core" business plus any projected new ventures. Three estimates are required: high, expected, and minimum levels of volume. The corporate manpower planning manager would request division staffs to estimate the exempt personnel that might have to be added to the work force to meet the profit center's plan. Exhibit 7 shows the form that is to be used for this purpose. These estimates are prepared by the divisions during the first calendar quarter.

The five-year business projections of the various divisions are submitted to a corporate planning group. Parts of the projections are given to the related functional corporate staff groups for their comments. The manpower sections are reviewed by corporate industrial relations. At this time the corporate staff may recommend adjustments, based upon information not known within any one division but available at the corporate level because the staff has seen the plans of all the divisions.

The recommendations are reviewed with the divisions during the second quarter and accommodations reached. By the end of the quarter the chairman's advisory committee has approved the projections as a basis for divisional budgeting. The budget preparation, for two years, takes place during the third quarter, with corporate review, adjustment, and approval coming in the final quarter of the year.

The longer time frame desired by the corporate staff is needed, they feel, for a more adequate job of planning the diversified operations of the new Scott Paper Company. For instance, development programs, employment of large numbers of people or those with very specialized skills, special compensation programs, all these require considerable lead time for success. The managers in the Packaged Products Division—paper mill managers, regional sales managers, and other operations-oriented men—who must develop the manpower estimates frequently, do not yet see the need for the information because it is not useful in their immediate operations. From the top, the company looks quite different today, but the change is not as noticeable at manufacturing plants or field sales offices.

In preparation for more effective manpower planning the company has introduced SIRIS, a computerized personnel information system. This system will allow analysis of mobility and projection of internal manpower supply, as well as providing for short-run operational needs such as candidate searches.

One part of the manpower planning that both corporate and division level personnel enthusiastically agree upon is the worth of the Management Resources and Organization Planning Analysis. This process, which takes several days, is usually undertaken about every three years. Men from both the corporate and division levels visit a mill or other such organizational unit for a series of discussions with all key management personnel. Generally, 20 to 25 managers are interviewed. The discussions cover the objectives of the units, the strengths and weaknesses of the manpower and its organization structure in terms of meeting those objectives, manpower requirements, training needed—anything, in fact, that could have a bearing upon the effectiveness of the unit. Exhibit 8 is a set of instructions for one such review.

The managers at the local installation welcome

EXHIBIT 7

Exempt Personnel Forecast

For each level of each strategic plan developed according to assumptions of specific corporate resources commitment, itemize incremental exempt personnel requirements according to the following format and criteria.

Core Business or Growth Opportunity and Commitment Level	Descriptive or Actual Job Title	Estimated or Actual Evaluation Points*	Timing		Number Required	Educational Degree where Critical	Field of Study where Critical	Job Experience where Critical
			Mo	Yr				

* Assistance in estimating Evaluation Points will be provided by Profit Center or Local Industrial Relations Staff.

EXHIBIT 8

Organization Planning Analysis Approach

1. Analysis teams consisting of corporate, divisional and local industrial relations personnel will conduct an analysis at the site of each organizational unit in face-to-face discussions with Managers and Division Heads. An overview of the analysis will be discussed with the General Manager of the organizational unit. A report of the consolidated analysis will be sent to the General Manager for his review and comment prior to any subsequent divisional or corporate review.

2. The analysis results for each functional area within organizational units will be prepared and reviewed with divisional, functional management (e. g., the Division Controller will review all accounting areas). These Managers will be encouraged to review their reservations regarding unit judgments and plans, additional significant information, etc. directly with unit functional heads and General Managers.

3. When the analyses are concluded within each organizational area of a profit center, they will be consolidated for review with the appropriate officers of each profit center prior to concluding the analysis for each profit center.

4. Results of all analyses at all profit centers when completed will be consolidated for review with appropriate corporate officers.

Note: The following material is taken from a memorandum sent to managers of one of Scott Paper Company's operations alerting them to a forthcoming Organization Planning Analysis.

On Wednesday, Thursday and Friday the Package Products Division Vice President—Industrial Relations and the Corporate Director of Personnel Administration will visit with us to conduct an Organization Planning Analysis of these operations. Your help is needed!

Please consider and be prepared to discuss during your interview significant year-to-year changes in any of the **exempt** and **non-exempt** job categories and the implications of these changes to your five year business plan with respect to:

1. Organization structure and the achievement of current and future objectives.

2. General employee performance levels and the achievement of current and future objectives.

3. Manpower development required to prepare available internal manpower resources for planned business objectives.

4. Personnel, facilities, equipment and tool required to develop skills to meet objectives for productivity increases, equipment startup, normal and vacation replacements, operations standardization, etc.

5. Numbers and skills of employees needed from other organizational units or from recruiting sources.

these analyses. It is not unusual for a man, at the close of his scheduled interview with the visitors from headquarters, to ask if he can meet them again after work to talk further about some idea he has for improving operations.

For the division and corporate personnel involved, the great value of these analyses lies in the questions they generate. "Are we using our managerial resources to greatest effectiveness?" "Can we anticipate problems that might come up in the future," With questions raised, all levels of managers can begin to develop answers that will make for improvement in the organization's effectiveness.

International Business Machines Corporation

Executives at the International Business Machines Corporation consider manpower planning to be the total process of ensuring that the company's manpower resource is properly utilized in the present and that it will be adequate to the company's needs in the future. With so broad a concept of the function, they obviously do not view manpower planning as being solely the responsibility of the designated manpower planning department. Rather, they regard manpower planning as a responsibility of the entire IBM management, with many individuals getting into the act.

For instance, the six-man manpower planning department is a part of the corporate employment and placement unit. That, in turn, is one of several personnel units on the corporate operations and services staff. The manpower planning unit has a role in the planning process, of course, but so do all other personnel units that have to plan the personnel activities needed for the proper utilization of the work force and its development.

However, the operations and services staff includes other staff units, among them marketing, manufacturing, and engineering. These units are involved in the total planning process, including manpower needs or activities as they affect their own areas of responsibility.

Then, in each division there is a coordinator of planning who monitors the divisional planning effort. The engineering, manufacturing, and marketing staff personnel play a role similar to that of their corporate counterparts, that is, the plans for their functional areas establish the work to be done for which adequate manpower provision must be made. And there are divisional and local personnel managers who obviously play a role.

Finally, operating managers at all levels in the company contribute information, suggestions, objectives, and programs to the over-all planning process. In short, the entire management is part of a planning network; some are directly involved in what can be identified as "manpower planning," while others play a more indirect part in the development of manpower plans. The corporate manager of manpower planning sees his job as ensuring that the rest of the network does the planning for people that is required.

The Planning Process

The development of divisional long-range plans begins in the spring. Plans are drawn up for seven years, the first two years in detail and an additional five in summary form.

To provide a framework within which the divisions can prepare their plans, and to guide the process, the corporate staff prepares a planning manual that outlines the assumptions the divisional planners are required to follow in their planning efforts. The economics unit develops forecasts of economic conditions for the entire planning period. The various corporate staff groups provide information about trends in their functional areas, new objectives for the company, and developments that may have a bearing upon the plans that the divisions can develop.

The manual also sets forth the information that must be included in the plan and the form in which it is to be presented. Exhibit 9 is an example of the manpower information required in a recent corporate planning effort.

Inasmuch as the planning manual is intended to guide the work of men in the various divisions, IBM believes that these men ought to have a voice in the development of the manual. Therefore, during the preparation of the manual the divisional staff men are consulted by their corporate counterparts so that differences of opinion as to what areas require planning or what information should be supplied can be settled before the planning manual is formally issued each June by the corporate planning staff.

The divisional planners coordinate the development of estimates of market potential for each of the products and services of the division, basing their estimates upon the economic forecast and other information in the planning manual as well as upon their own experience with the division's business. From these estimates, manufacturing and engineering personnel can develop operations schedules. These estimates

EXHIBIT 9

Planning Forms of the International Business Machines Corporation

Division Strength Projection

(Number of Employees – Year End)

	ACTUAL	BUDGETED	PLANNED			
	1968	1969	1970	1971	1972	1973
Field (total)						
Manufacturing (by location)						
Engineering (by location)						
Product Test (by location)						
Headquarters Staff						
Manufacturing Staff						
Engineering Staff						
General and Administrative						
Other (specify)						
TOTAL DIVISION						

Research and Engineering Manpower Summary*

Division____________________ Location____________________

	12/31/69			12/31/70			12/31/71		
Primary Work	Prof.	Tech.	Total	Prof.	Tech.	Total	Prof.	Tech.	Total
(Note: See attached instructions 4-2 for Primary Work Classifications appropriate to each division)									
Subtotal	____	____	____	____	____	____	____	____	____
Administration and Technical Support	X	X	____	X	X	____	X	X	____
Total Manpower									
Total Management			____			____			____
Professional Manpower by Degree Level:									
B.S									
M.S.									
Ph.D.									
No Degree	____			____			____		
TOTAL									

* Only done in detail for 2 years.

Research and Engineering Manpower

Definitions

1. The Research and Engineering Supplemental Code procedure defines Professional, Technical, and Administrative and Technical Support manpower as well as Primary work and Administrative and Technical Support Work.

2. Other functions which the division feels should be listed separately from those already indicated under Primary work may include (except FSD):

- 2.1 Cost Centers.
- 2.2 Major components of Other Laboratory Effort (other than Planned Program effort) such as contracts, work for other divisions, functions, or laboratories, and effort charged to Work in Process.
- 2.3 Other miscellaneous activity.

For FSD:

- 2.1 Investment program projects which are not included as part of one or more of the principal business action areas.
- 2.2 Cost Centers.
- 2.3 Other elements of the total R&E effort at a location such as work for other divisions, functions, or locations, and any effort charged to work in process.

Instructions

1. One manpower summary sheet is to be prepared for each laboratory location and also for R&E employees at the headquarters location. The data for individual locations should be added and entered on one summary sheet for the entire division.

2. Planned manpower for individual primary work responsibilities in the Other Functions category should be shown on separate lines on the summary sheets.

3. Total manpower shall equal the total number of regular employees reported for the specified date in the Workload Projection Schedules.

R & E Manpower Summary — Primary Work Classifications

1. Advanced Systems Development Division

- Advanced Technology
- Manufacturing Industries
- Technical Development
- Market Analysis and Planning
- Information Sales
- Information Service Systems
- Medical Information Systems
- Credit & Collection Terminals
- I/O Subsystems
- Other (list separately)

2. Components Division

- Logic Products
- Packaging Engineering
- Technology Development & Assurance
- Memory & Special Products
- Other (list separately)

3. Federal Systems Division

- Avionics
- Space
- Information
- Tactical
- Exploratory
- Other (list separately)

4. Information Records Division

- Advanced Technology
- Consumables Engineering
- Systems and Consumables Engineering
- R&S and Standards
- Other (list separately)

5. Office Products Division

- Dictating Equipment
- Typewriters
- Chemical Products
- New Products
- Technological Support
- SD Accounting Machines
- SD Communications
- Other (list separately)

6. Research Division

- Mathematical Sciences
- Applied Research
- Computing Systems
- Information Sciences
- Physical Sciences
- Other (list separately)

7. Systems Development Division

- General Systems
- Application Systems
- Systems Components
- Systems Programming
- General Engineering
- Advanced Technology
- Memories
- Other (list separately)

Programming Manpower[1]

Division________________

Experience Levels by Classification of Programming[2]

Systems Programming (Type I)
    Managerial (Project, Development, Sr. Managerial)
    Non-managerial (Associate, Senior Associate, Staff, Advisory, Senior)
    Preprofessional (9964-09, 997-09)
    Technical (6571)

Applications Programming (Type II)
    (experience levels)

Advanced Technology Programming
    (experience levels)

Programming Research
    (experience levels)

Programming Product Test
    (experience levels)

Scientific Computing Center (internal service)
    (experience levels)

Programming Design and Logic Automation
    (experience levels)

Systems and Procedures, Methods, Addministrative, and Financial Programming
    (experience levels)

Contract Programming (non-Federal Government customers)
    (experience levels)

Contract Programming – Federal Government
    (experience levels)

Other (specify)
    (experience levels)

Totals (by experience levels)

[1] Employees with Programming Position Codes.

[2] Use only those classifications of programming applicable to the division.

IBM Workload/Buffer – Manpower Projection – Operating Plan*

Division________________Location________________Function________________

1969	1970				1971	1969	1970				1971
Year End	3/31	6/30	9/30	12/31	Year End	Year End	1stQ	2ndQ	3rdQ	YE	Year End

A. Projected Workload[1]

1. Workload for regular employees at straight time
2. Workload buffer (equivalent manpower)
   2.1 Overtime (also indicate %)
   2.2 Supplemental employees
   2.3 On-premises contract personnel
   2.4 Out-plant buffer
   2.5 Other (specify each type separately)
3. Total workload buffer
4. Total workload (1+3)
5. % buffer (3÷4)

B. Projected Manpower – regular employees

1. Manpower beginning of period
2. Gains – projected hires (new and rehires)
   2.1 Professional – Eng.
      a. College
      b. Experienced
   2.2 Technical
   2.3 Administrative
   2.4 Direct
   2.5
   2.6
   } as appropriate to function
3. Gains – projected transfers in and returns from leaves
   3.1 Transfers in
   3.2 Returns from leaves
4. Total projected gains
5. Projected losses
   5.1 Voluntary separations
   5.2 Involuntary separations
   5.3 Leaves, death – other
   5.4 Transfers out
6. Total projected losses (4+5)
7. Manpower end of period (1+4–6)

(See attached instructions)

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* Only done for one year.

[1] For Manufacturing prepare separate projected workload charts for direct and indirect workload at each location.

Instructions for Completing
IBM Workload/Buffer – Manpower Projection

I. Preparation of Charts – All data on separate location and function charts shall be summarized on a net basis and entered on one divisional projection sheet.

Manufacturing/Research and Engineering

Separate charts for each location (including headquarters where applicable. Research and Engineering employees are those assigned on a permanent basis to Research or to the Product Development function within the division or subsidiary.

Product Test

Separate chart for Product Test employees for for each location.
Marketing (Field Sales)
One chart for the function, including all sales

representatives, new account representatives, sales trainees, and marketing representatives, Exclude quota managers – SRA include staff associates and field associates.

Service

One chart for the function, including employees in the Field, Districts, Areas, Headquarters, Education Departments, AMD, Plant Customer Engineering, and Parts Center.

Systems Engineering

One chart for the function, including all systems engineers and systems engineering trainees.

Administration

One chart for – BOA, AOO Headquarters, G&A Regional Headquarters, Area Headquarters, Central Headquarters (separate charts for each headquarters location).

Other employees not functionally assigned

This should reflect all employees not included in one of the previously described functions. The combination of the functional charts and this chart for each division should equal total division strength.

II. Definition of Items

A. Projected Workload

Manufacturing/Research and Engineering/Product Test

Workload is to include:

1. Own division's IBM projects and support functions, including projects whose expense is deferred and/or capitalized, less all work done for such projects by other divisions.
2. Work done for other divisions.
3. Work supported by outside contract.

Marketing (Field Sales) and Systems Engineering

Generally not applicable.

Service

Show total number of employees required to perform all assigned service function activities as of the specified dates. It is recognized that Workload Buffer as specified in Section A will have limited applicability in the Service function.

Administration

Indicate as applicable.

Field Manpower Summary – DPD
(Number of Employees – Year End)

	Actual	Budgeted	Planned	
	1968	1969	1970	1971
Branch & District Office Sales				
Br. Off. Sales				
Br. Off. Systems Engineering				
Spec. Mktg. Programs				
Dist. Off. Sales & Admin.				
Total				
Branch Office Administration				
Sales Education & Test. Ctr.				
Educ. Ctrs. – Field				
Educ. Ctrs. – Plant				
Customer Testing				
Prog. Info. Centers				
Total				
Reg'l. Office Mktg. & G. and A.				
Industry Programs				
Total Division				

by plants, laboratories, and sales offices form the basis for the detailed manpower and other planning of the local establishments.

In September, line and staff managers at these local installations estimate the labor force that will be needed to fulfill the work schedules established in the manufacturing and engineering components. A variety of manpower planning tools are used for reaching these estimates: e.g., ratios of manpower to product or service volume, ratios of direct to indirect labor, learning curves on manpower productivity in relation to new or redesigned products, and data on attrition rates. These tools permit the local managers to estimate quite accurately the manpower requirements of their part of the division's plan.

These estimates are reviewed and possibly revised by the planning staff and other line and staff managers within the division. There are many trade-offs available to a division manager to obtain better utilization of manpower and other resources than would result from the mere aggregation of the plant and sales offices plans. In the manpower area, the division manager and his staff may weigh the benefits of recruiting needed new skills from outside the company against the value of training and upgrading present employees. The costs of manpower to service customer equipment can be balanced against the costs of product redesign to reduce the need for servicing. The manpower needed to produce some mechanical part may be subtracted from the plan by a decision to subcontract that bit of manufacturing because the part run is considered too small for economical tooling up.

Many such trade-off decisions can be made at the division level, and it is the job of the division headquarters managers to synthesize the estimates into a viable and profitable division business plan.

In this process the division planning coordinator functions primarily as a monitor of the process, seeing to it that elements of the plan are properly related to one another and that planning schedules are adhered to. By the end of October, according to schedule, the division's summary plan should be ready for review by the corporate planning staff.

There are two weeks to a month of review of the plans by the corporate staff groups before the formal submission of the divisions' plans to IBM's management committee. Marketing reviews the marketing aspects of division plans; engineering looks over the engineering sections; manpower planning and the various other personnel units examine the manpower sections. Some of these staff groups—the more "operational" units, such as marketing and manufacturing—are required to prepare a formal critique of their sections of each division plan. The other staff groups are merely asked to review the plans and either concur in them or indicate any questions they have about them.

As in the preparation of the planning manual, IBM attempts to resolve differences of opinion between the corporate staff groups and their divisional counterparts through discussion and debate before the plans are finally submitted to the management committee. Differences may arise because the corporate staff has information across division lines that is not available within any one division; when the facts are known, differences can usually be resolved. In other cases the corporate staff, viewing the plan for the first time, may see in it things that the division planners had overlooked because they had grown too close to the details in the lengthy planning process. Merely raising a question about whether they really expected to be able to achieve a plan that required 12% improvement in productivity, for instance, has caused division personnel men to rethink their estimates and modify what on second thought seemed unrealistic.

Finally, about the end of November, the divisions' plans are submitted for review and approval to the corporate management committee.

The Manpower Plans

The division plans spell out the manpower needs for accomplishing the business objectives, and for maintaining the competence and motivation of the employees. There are recruiting objectives and the programs and schedules for attaining them. They are the plans for training employees in skills that will be required, for the development of managers, for the transfer or promotion of professionals, and for the reorganization of units to achieve greater effectiveness.

Necessary routine training is decided upon and carried out in the divisions. Hiring of machinists for a plant or of a salesman for a branch sales office may be done locally. Yet these actions, and the plans for taking them, flow from needs determined in the development of the divisions' long-range plans.

Activities of the "Manpower Planners"

If the corporate manpower planning staff does not really "do" the manpower planning, what then does it do? At IBM its function is twofold: first, it helps devise the system for manpower planning and "tests the system," that is, monitors it to ensure that it is working properly and on schedule; second, it provides advice, counsel, and professional expertise to the rest of the organization.

For instance, the manpower planning staff has helped divisional personnel men to develop techniques for measuring productivity and for estimating changes in productivity. This is a necessary tool for divisional planning, though the manager of manpower planning considers it "educated guessing at best." He explains that while it is possible to determine what productivity is and has been, that does not show what it could and should be. It is a matter of managerial judgment to state what productivity increases should be attempted, he holds.

As another example of this "operations research on manpower" carried out by the manpower planning staff, the unit undertook an analysis of the educational backgrounds of technicians employed by the company. It had been assumed in the company that almost all the technicians were graduates of two-year college programs. In fact, the data showed, only about 25% were graduates. Furthermore, the field forces seemed to employ a greater than average proportion of two-year college graduates, while the laboratories seemed to have a lower than average ratio of graduates to nongraduates among their technicians. This analysis raised several questions. Since 75% of the technicians are not graduates, is graduation from a two-year program a necessary qualification for the jobs? Is it a desirable qualification? Are technician jobs adequately staffed? Are professionals in the laboratory being given the technical support that will make for optimal use of their professional skills?

In another project, the manpower planning staff analyzed the age distribution of the company. Because of the high proportion of relatively young people in the company, age has not been an important factor in the company's plans. The study raised questions about the future problems likely to be associated with an aging work force: Where in the company are the problems apt to arise? What is being done throughout the company to anticipate those problems and to alleviate them?

The manpower planning staff does not attempt to provide final answers to questions such as those concerning technicians or the aging of IBM's work force. Rather it raises the questions on the basis of hard data it has developed and presents the data and the questions to line management for solution. This is consistent with the company's belief that manpower planning is a management responsibility that cannot be delegated to a specialized staff group alone.

Chapter 5

Information To Stimulate Action

Union Oil Company of California

MANY OF THE DECISIONS involved in the utilization of manpower, and perhaps most of the actions, have to be taken by line management. In a decentralized company, division managers may have the final authority to determine recruiting levels, organizational assignments, the nature and availability of development programs and opportunities, and the goals toward which the division's managers work. A competent staff may help by highlighting potential manpower problems, developing pertinent data, recommending solutions to difficulties, and monitoring performance. At some point, however, a line manager generally has to make the decision to go ahead with manpower actions.

That is the situation in the Union Oil Company of California. Union Oil has a high degree of decentralization; the presidents of the various profit centers have an unusually high degree of authority to manage their divisions as they think best. Manpower is one of their most important resources and they have broad discretion as to how they will use that resource to its best advantage.

The manpower planning and development staff, both at corporate and divisional levels, has the responsibility for assisting line management to make proper use of manpower. On behalf of their line superiors they conduct recruiting campaigns, maintain an automated personnel inventory, search for qualified men when openings become available, develop training programs, coordinate an appraisal system, and do the many specialized tasks that are part of manpower management in a large organization. They also undertake studies of utilization and manpower needs, on the basis of which they attempt to alert line management to both current and future manpower problems and opportunities.

Of course, that could be said about the personnel, employee relations, or manpower staff of almost any large company. Furthermore, in almost any large company, *how* the staff conducts its studies and offers its analyses and advice may make the difference between its making a contribution to the effective utilization of manpower in the organization and its just being involved in busywork. The manpower planning experiences of Union Oil bear this out.

For several years the company's manager of corporate development and training services has conducted annual studies of the total company's needs for management replacements. The reports evoked some interest, he says, but little action. But when, in 1969, he designed a study, and presented the findings from a line manager's perspective, management took notice—and took action.

The Need for Replacements

Manpower management at Union Oil is obviously concerned with the total work force. For several reasons, however, long-range planning considerations revolve around the managerial and professional segment of that total.

For one thing, the nonmanagerial work force has been decreasing at Union Oil as in most petroleum companies. Shortages of competent personnel at these levels have not been a serious problem. Further, the company has contracted out a great deal of nonsupervisory work; drilling operations are handled by contractors, as are well operation and maintenance and many other blue-collar activities. Service stations are mainly franchised, independent operations. For those reasons, projecting the numbers of nonsupervisory employees needed can be done adequately on a short-range basis.

Managerial and professional manpower is another matter altogether. It has usually been scarce. It takes longer to become fully productive. Its development within the company tends to be crucial to the performance of these key personnel, and the development process takes a considerable amount of time. Purely short-range planning of managerial manpower moves can lead to the development of serious problems.

Therefore, the corporate manpower staff had originally projected on an annual basis the company-wide need for managerial replacements during the ensuing five-year periods. These "Succession Studies" drew upon data developed in the company's replacement planning work. In Union Oil, division line and staff managers identify men who seem to have potential for larger responsibilities and mark them as prospective replacements for higher level managers. The aim is to have more than one replacement named for each key managerial position. Ideally, one replacement is judged "ready now" while the other may be seen as "ready in two or three years," "ready in four to six years," and so forth. The developmental experiences needed to get a man ready are identified and plans are made to provide them.

The Succession Studies drew upon this body of information about replacements to analyze whether or not the plans for managerial succession were adequate to the needs of the future. Primarily the studies examined the age distribution patterns of present managers and of the identified replacements. The findings were presented to line management in the form of bar graphs showing these distributions. Exhibit 10 simulates the type of graphs used in the 1968 Succession Study.

The first chart (displaying hypothetical figures) shows more replacements than positions up through the 45-to-49 age group. Beyond that, the number of replacements falls off. That is to be expected, inasmuch as the company tries to spot possible replacements among the younger men in the company.

In this exhibit the group from 35 through 54 years old is singled out for special attention. These are the ages of most of the middle-level managers in Union Oil, as they are in most companies. This is, therefore, a critical group of positions to be filled with competent men. For this reason, projections of the positions and the replacements in this age group were made for five-year and ten-year periods. The nature of these projections is simulated in the two projections of Exhibit 10 on page 55.

The Succession Study made the assumption that the age distribution patterns of the men in middle management positions would be consistent throughout the periods covered by the projections. Thus, in the projections, the number of positions to be filled by men of any given age is shown as equal to the number of managers of that age currently employed, plus an allowance for the growth of the managerial work force. The assumption is open to question, of course. Faced with an actual decline in the number of men in this age bracket because of the low birth rates of the depression years, Union Oil and other companies may well change the age distribution of their managerial work force, moving younger men more quickly into positions of increased responsibility. However, in making the study, the corporate staff chose to use what was considered the conservative assumption that management practice in this regard would not change in any significant manner.

Projecting the number of available replacements was simply a matter of "aging" the current distribution, that is, moving each bar over one age group for the five-year projection and over two age groups for the ten-year. Thus the replacements currently aged 30 to 34 were shown in the five-year projection as aged 35 to 39. The size of these replacement groups was reduced by an amount equal to the attrition to be expected in these age brackets, based upon company experience.

The graphs show that, without preplanning, in five years there could be shortages of men aged 35 to 44 available as replacements for the positions usually filled by men of those ages. There would be more replacements than needed for the age groups 45 to 49 and above. In ten years, however, there could be shortages of available replacements for most positions currently filled by men from 35 through 49 years of age.

While these earlier reports seemed to indicate quite clearly that strong effort was needed to avoid a serious shortage of management talent in a relatively few years, they were "received with mild interest" but did not generate any new sense of urgency. Yet the lead time necessary to develop a good manager makes it urgent that additional replacements be identified early and their development hastened.

The manager of development and training services says that he believes the fault lay in the format of the report. It highlighted a potential company problem but it did not speak to the individual concern of any particular line manager. The report was "staff oriented" rather than directed to the line man's problems.

The 1969-1974 Managerial Manpower Study

A different approach was taken for the analysis in 1969 and a much different format was used for presenting the findings. This approach focused upon the manpower planning responsibilities of individual managers.

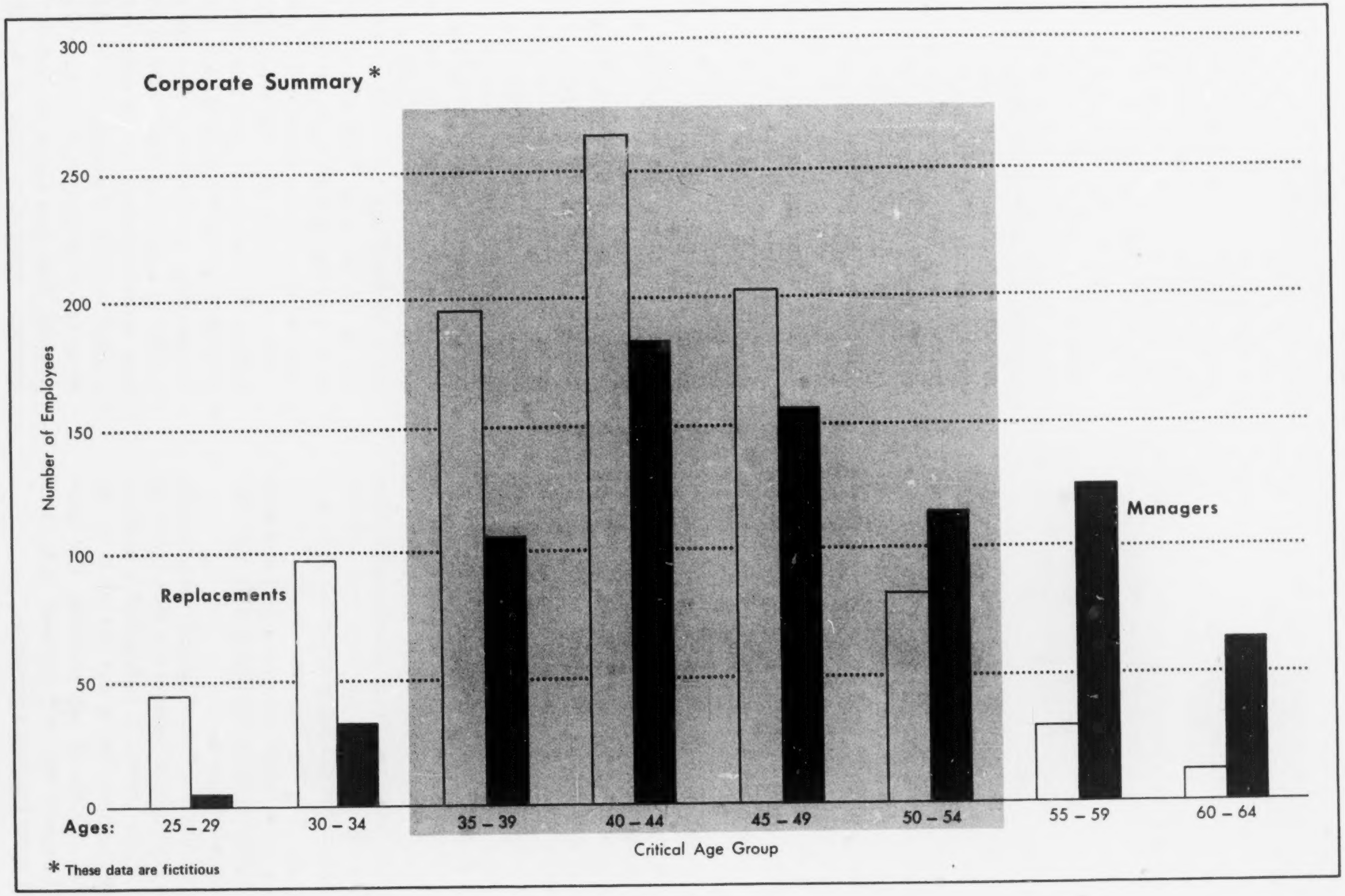
The approach was predicated on the idea that an executive—a division president, for instance—would be particularly interested in the number of openings to be anticipated among his immediate subordinates and among the men reporting directly to them; that is, three levels of management, including himself. He would know that he had general responsibility for the development of the whole managerial force in his division, but his personal concern would be for that smaller group whose careers he directly influenced, whose replacements he would have to train and select, and whose work most closely dovetailed with his own. The study, therefore, was broken into 18 "study units" of the organization, each unit consisting of an executive in charge, his immediate subordinates, and their immediate subordinates.

For example, one study unit included the chief executive officer of the company, the corporate senior vice presidents, and the men reporting directly to them. The presidents of the major divisions of the company (corporate senior vice presidents) were, of course, included in that study unit. However, each was also part of another unit in which he was the executive in charge and which included the two levels of men beneath him in the hierarchy. With that overlap, the 18 study units included the top five levels of management in the company, a total of 519 positions.

For each study unit, the report showed the number of managerial positions included, the number of incumbent managers who would reach the usual age of retirement within five years, the number of separations that could be anticipated from earlier retirement or for other reasons, the probable number of deaths, and an estimate of losses due to promotion out of the study unit in question. That gave a total for "primary position openings" expected to occur in the unit within

EXHIBIT 10

1968 Succession Study Charts



* These data are fictitious

EXHIBIT 10 (Continued)

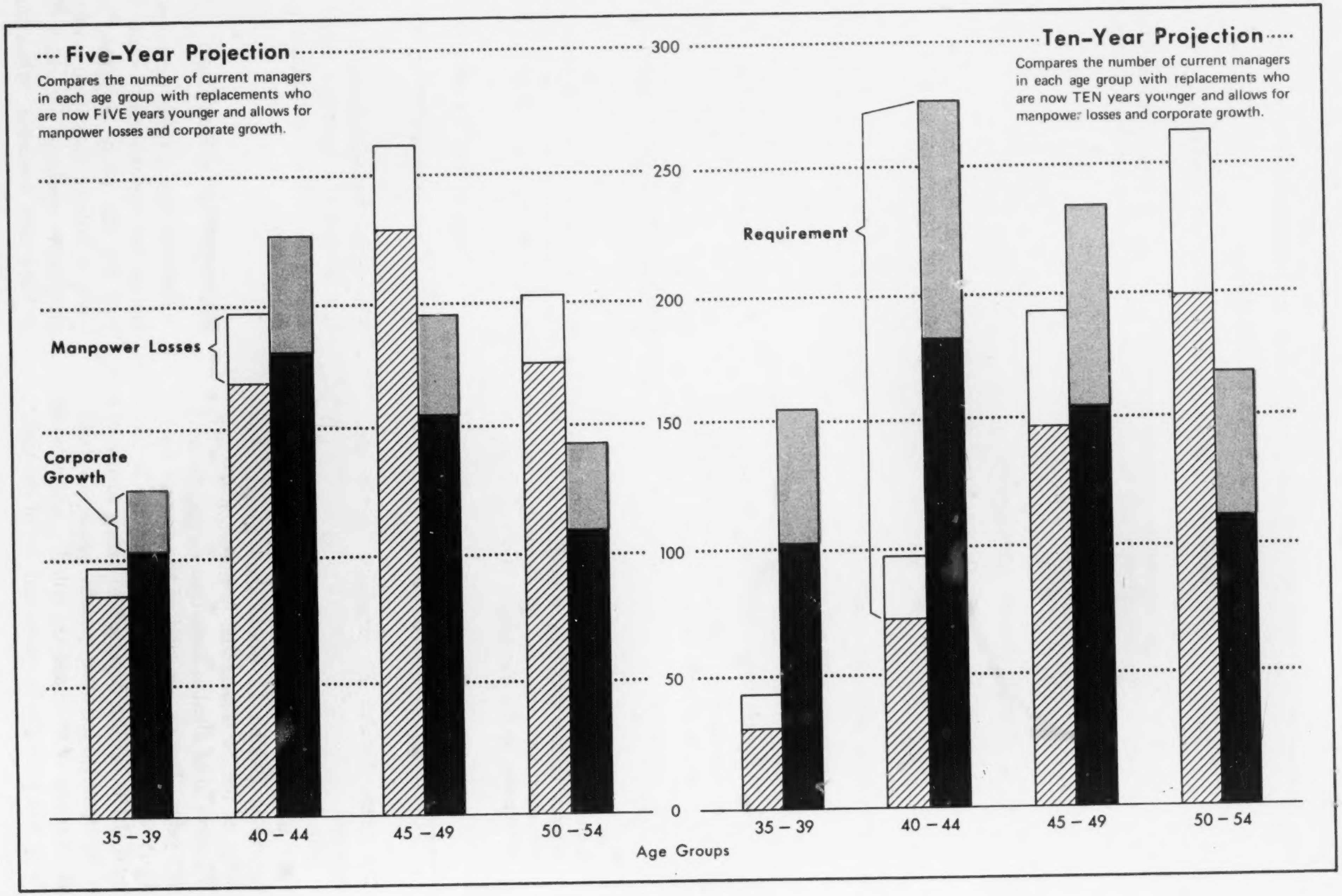


EXHIBIT 11

Union Oil Company

1969-1974 Managerial Manpower Study

An estimate of managerial position openings to occur in the next five years, for the top three levels of management in the organization and for an equivalent three levels in each of its major divisions and departments.

STUDY UNIT

Sample Division (Management)

John D. Doe (Executive in Charge)

NUMBER OF POSITIONS IN UNIT	51

ESTIMATED PRIMARY POSITION OPENINGS, 1969-74

1. Managers who will reach age sixty-two	10
2. Separations and earlier retirements	5
3. Actuarial losses among non-retirees	1
4. Net personnel losses through promotions, etc. to other units of the study	24
TOTAL PRIMARY POSITION OPENINGS	40

Note: The study is based upon reporting relationships. Each unit contains the unit head, those reporting directly to him and their immediate subordinates. Estimates are based upon past experience; but it is assumed that increased efficiency will hold the number of positions even despite corporate growth anticipated in the Company's Ten Year Plan.

Corporate Industrial Relations

five years. Exhibit 11 simulates one of these reports.

The findings were startling to many of Union Oil's managers. For example, the hypothetical figures in Exhibit 11 would show that at least 80% of the 51 managerial positions in the unit will have to be filled at some time during the next five years. Twenty per cent of the current managers will reach the usual retirement age in that time, 10% can be expected to retire earlier or to be separated for other reasons, actuaries would say that one of the managers will die, and almost 50% will probably be promoted out of the unit. The report highlighted that a considerable number of primary openings could be anticipated among the 519 key managerial positions covered in the study.

Management's Reaction

Disbelief was a fairly common initial reaction among the line managers when they saw the report for the study unit they managed. They couldn't believe that there could be that many prospective openings for which they would need to have men available. When they checked the figures in the report, however, they discovered that the findings were conservative. The situation was, if anything, even more pressing than the Managerial Manpower Study had indicated.

Many of the managers have now repeated the study for their own units, starting from scratch. The basic Managerial Manpower Study had been done with such data as were readily available to the corporate development and training services manager. Most of that data was statistics on typical turnover by age groups, retirement ages, and so forth. The line managers, however, have much more specific information about their own organizations and manning plans for their units and about the career goals of their subordinates. In a company with a large proportion of scientists and engineers among its managers, it was almost inevitable that many of the divisions would repeat the study for themselves, using the specific information available to the division manager.

Indeed, the initial study had been designed especially to make it easy for a manager to tailor it to his own unit. The purpose had been to stimulate line management to focus attention on its own manpower needs.

With the size of the replacement need dramatically called to line management's attention, things began to happen. One division increased its college recruitment goals by 10%, another by 30%. One division did an extra midyear succession study to identify available managerial replacements and took action to provide needed developmental experiences. One division is providing a greatly increased amount of cross-functional training for its more junior managers.

How the Study Was Conducted

The Managerial Manpower Study was carried out through the application of statistical and actuarial techniques to manpower data. As noted above, the study units chosen were defined as an executive, his immediate subordinates, and their immediate subordinates. In the top five levels of management there were 18 such overlapping units.

Determining the number of positions was simply a matter of counting. Determining the number of men who would reach retirement age within the five-year span of the study was almost as simple. While 65 is the mandatory retirement age at Union Oil, for the past several years the actual average age at retirement has been about 62 years. Therefore, that was taken as the usual age of retirement and the number of managers reaching that age within five years was determined from employment records.

Employment records for the past several years were examined to determine the number of men in the top five levels who retired earlier than 62 or who separated from the company for other reasons. That number had averaged about 2% of the total number of managers in those levels and the 2% figure was used to project such losses. However, the 2% estimate was applied only to those men who would not reach age 62 since the others were already accounted for.

Insurance company mortality tables were used to determine the number of deaths to be anticipated among the managerial group after a quick check revealed that there were no apparent differences in mortality between industrial managers and the population as a whole.

Finally, for each study unit an estimate was made of the number of men who would be promoted out of the unit. The estimate was obtained from the number of openings that could be anticipated in units higher in the management hierarchy than the unit under study. Movement within a unit—for instance promotion from the third level to the second—was not considered at this point.

As shown in Exhibit 11, the total of these four losses—retirements at age 62, earlier retirements and other separations, deaths, and promotions out of the study unit—were labeled "primary position openings." Each of these losses would create at least one opening within the study unit that would have to be filled by an identified replacement.

It must be noted that not all of the primary position openings represented losses to the company, even though they were losses to a particular study unit. Retirements, separations, and deaths represented losses to Union Oil as a whole.

Promotions out of the unit, however, meant promotions *into* some other unit. For some units, which traditionally had been net "importers" or net "exporters" of managerial talent, the number of promotions was adjusted to reflect the probability that this would continue to be the case. The focus of the reports was not on the total manpower needs of the Union Oil Company but rather upon the placement decisions that particular managers would be faced with in the ranks of their immediate subordinates and those reporting to them.

Chain-reaction Openings

The report recognized that filling an opening at a high level in an organization usually generates another opening that must be filled, which in turn creates another opening at a still lower level—the chain-reaction effect that traditionally results in an organization's hiring a new office boy after the series of promotions made when the president retires. The report notes that a "primary position opening" at the second level in a study unit would probably be filled by a man at the third level, thereby creating a "chain-reaction opening" at the third level. The reports for individual study units did not attempt a numerical estimate of the chain-reaction openings to be anticipated. However, the report did suggest that a factor of 1.33 be used to estimate the number of chain-reaction opening that would be generated within a study unit and the first level of management below it for each primary position opening that would occur within the unit.

However, the chain-reaction effect was taken into consideration in the reports for five "study unit composites." These composites were larger segments of the organization than individual study units. The top five levels of management in the company were combined into one composite. To create these composites, the figures for the study units represented in the composite were adjusted to remove the overlap among levels. For the composites, in addition to the other factors reported upon, the reports estimated the number of chain-reaction openings to be anticipated within the composite and in the next one level down. (See Exhibit 12 for a simulated composite.)

When the chain-reaction openings were included, the figures became even more challenging. The primary- and chain-reaction openings exceeded the number of positions within the composites. In one case, there were more than twice as many placement decisions to be anticipated than there were positions within the composite. Clearly, despite the succession planning already done, the managers of these units would be looking for many good men within the company in the space of the next five years.

No Allowance for Growth

The report cited the fact that total employment had remained constant for several years but that managers and professionals had become a larger part of the total. Nonetheless, with one exception the reports for study units did not make allowance for an expansion of the management group as a result of company growth. The assumption was made that efforts to increase the efficiency of manpower utilization would be successful and that total managerial manpower could be held constant in spite of company growth.

Ignoring the possibility of increased numbers of positions to be filled because of growth tends to underestimate the probable placement decisions in which a manager will be involved. The report calls attention to this conservative bias. It notes, indeed, that 85% of the managers in one study unit have occupied their positions for less than five years. That represents considerably more turnover that is projected for the unit for the next five years.

The report was deliberately designed to be conservative. The figures could be expected to be startling; it could be anticipated that at least some of the line managers would question them and recheck the findings. If it had developed that the estimates erred on the high side, the whole study and its findings might have been discounted. By deliberately staying on the conservative side and calling attention to the probability that the need for qualified replacements might even

EXHIBIT 12

Union Oil Company

1969-1974 Managerial Manpower Study

An estimate of managerial position openings to occur in the next five years, for the top three levels of management in the organization and for an equivalent three levels in each of its major divisions and departments.

STUDY UNIT COMPOSITE
Sample Division
John D. Doe

NUMBER OF POSITIONS IN COMPOSITE 229

ESTIMATED PRIMARY POSITION OPENINGS, 1969-1974		Cum. Totals
1. Managers who will reach age sixty-two	54	
2. Separations and earlier retirements	24	
3. Actuarial losses among non-retirees	7	85
4. Primary personnel moves within and out of the composite	93	178
5. Additional "chain-reaction" openings generated (1.33 times sum of Items 1, 2, 3, and 4)	236	
TOTAL PERSONNEL REASSIGNMENTS		414 (181.6%)

Note: The study is based upon reporting relationships. Each unit contains the unit head, those reporting directly to him and their immediate subordinates. Estimates are based upon past experience; but it is assumed that increased efficiency will hold the number of positions even despite corporate growth anticipated in the Company's Ten Year Plan.

Items 1, 2, 3 are openings which result from persons moving out of the Company. Item 4 includes primary openings which result from moves out of the composite or between its units. Item 5 comprises supplementary moves generated by items 1, 2, 3 and 4 in the units' third levels and at immediately lower levels of the organization.

The Total Personnel Reassignments figure is a rule-of-thumb estimate of the number of manpower reserves to be included in the Composite's succession planning.

Corporate Industrial Relations

be higher than the estimates given, the manager of development and training services set a framework for management to convince itself that action was called for.

The Method and the Message

It was these estimates of the surprisingly large number of openings to be filled within five years and, therefore, of the large number of men who would have to be prepared to fill them, that triggered the increases in recruiting activity, cross-functional experience, and other manpower development efforts. But the needs hadn't developed between the time of the 1968 Succession Study and the 1969 Managerial Manpower Study. They had existed all along. Close analysis of the bar charts in the earlier reports revealed the same facts that were apparent in the study unit reports.

What was different in the 1969 reports was the perspective. The earlier studies had been carried out from a staff viewpoint, a concern for the manpower problems of the whole company but without highlighting the problems and concerns of any one executive.

The Managerial Manpower Study focused on the concerns of particular operating managers and the reports were presented from his point of view. How many openings might he personally be involved in filling in the next five years? How many men must he have coming along at lower levels in his organization to be assured of adequate replacements when needed?

With the information developed and presented in that light, line managers could respond to the situation—and they did. At Union Oil today, planned efforts are being made, by the line managers who can take effective action, to see that managerial manpower will remain adequate to future needs.

Chapter 6

The Corporate Plan Includes Manpower

Lockheed Aircraft Corporation

*A*T THE BEGINNING *of 1970 John Doe was planning to build a house. He and his wife had decided upon their immediate space requirements but were planning for the additional rooms that would be needed when they added to their family. They could foresee the time when John could build the darkroom he wanted and Jane could have the sewing center she dreamed of, and their plans provided for these additions. Then, John lost his job.*

John and his wife have shelved their plans for the house, at least temporarily. Now their planning is much shorter range; it's concerned with the day-to-day job of making ends meet until he can get back into a steady job with a future that permits of making long-range plans. But John has not given up the idea of planning just because he has had to shift from the long range to the immediate and change his focus from doing what he'd like to doing what he must.

The story of John Doe and his planning efforts has parallels among the companies interviewed during this study. Many have had to alter or shelve their long-range plans during 1970 to concentrate upon weathering the business recession. The Lockheed Aircraft Corporation is a particularly striking example.

The case report that follows was written before the events that have faced the company with an acute business emergency. It was written to illustrate the way one company has achieved the integration of its manpower planning into the corporate long-range planning effort. It still serves to illustrate that point and, therefore, it has not been rewritten.

Recent word from the company says that a "moratorium" has been placed on all functional long-range plans—the plans for science and engineering, marketing, manufacturing, and finance as well as the long-range plans for manpower. Lockheed has had to concentrate upon the immediate problems at hand.

As the case report shows, the planning effort at Lockheed requires the identification of things that could go wrong and the development of contingency plans for dealing with them. It requires gauging the probability that any particular threat *would develop. What has happened at Lockheed is that a number of things in the company, in other companies, in government policy, and in the general economy have gone wrong simultaneously. No company has yet developed a planning process that successfully anticipates an improbable confluence of problems.*

While the long-range manpower plans have been shelved, at least temporarily, the results of the company's past planning efforts are still being put to use. While thousands of employees have had to be laid off, about a thousand scientists and engineers have been spared layoff because the company has been able to shift them from the curtailed government projects of Lockheed's Missiles and Space and Georgia companies to the commercial Tristar Jet program of its California company. The identification of "heartland" technologies in each division (explained in the case report) has prevented the company from destroying, through layoff, the technological capacity it needs to rebuild on a solid base.

The information about its manpower resource, developed through its long-range planning efforts, is now being used to help Lockheed weather the current crisis. No company would choose to use its manpower planning capability that way. But Lockheed feels fortunate that it is able to do so.

THROUGHOUT THE LOCKHEED Aircraft Corporation there are men involved with manpower planning. But there is no "manpower plan." There are only corporate and divisional long-range plans, including functional plans concerned with marketing, manufacturing, finance, science & engineering—and manpower.

The corporate director for manpower resources defines manpower planning as "a process that has the purpose of assuring that future manpower requirements are met," and he adds that the full gamut of industrial relations activities is included in manpower planning: recruitment, selection, placement, training, compensation, and labor relations.

A key phrase in his definition is "future manpower requirements." The future manpower required for the company can only be determined from a concept of the company in the future and the activities in which it will then be engaged. The work to be carried out determines the amount and type of manpower that will be required; the availability of that manpower determines whether or not the work can be carried out. In Lockheed's experience, it is possible to plan successfully in one area, such as manpower, only when all plans mesh into a total plan. Its planning process is designed to get the whole organization involved in a unified planning effort.

Lockheed's Organization

Lockheed's business operations are carried out by nine major divisions or subsidiary companies, some of which have divisions of their own. Lockheed Missiles and Space Company, with its three large divisions, constitutes a group. The Lockheed-California Company and the Lockheed-Georgia Company, by virtue of their size, are also considered as group companies. Other companies include: Lockheed Propulsion Company, which primarily manufactures propellants; Lockheed Aircraft International, which handles Lockheed's foreign business; Lockheed Air Terminal Company, which fuels and services commercial airliners and operates the Hollywood-Burbank airport; Lockheed Shipbuilding and Construction Company; Lockheed Electronics Company; and Lockheed Aircraft Service Company.

The corporation employs 84,000 people, 16,000 of whom are scientists and engineers. Eighty per cent of the manpower is concentrated in the three largest companies. The corporate staff is small for so large a company; there are only 345 on it, many of them marketing men located away from the corporate headquarters. The central headquarters staff numbers only 200, including the clerical force. It is essentially a planning and coordinating staff.

The entire corporate industrial relations unit consists of 17 employees, including clerical workers. A vice president of industrial relations is assisted by five directors, one each for manpower resources, employee benefits, labor relations, organization planning, and "personnel"—management development, Equal Employment Opportunity programs, and other such activities of corporate concern.

There are other corporate staff groups for finance, legal, public relations, contracts and estimating, manufacturing, marketing, procurement and facilities, and science and engineering. These, too, are small groups. Of special significance in connection with planning is a nine-man group of planners, the corporate development planning department, located in the science and engineering function. The development planning department, which includes engineers, scientists, and economists, bears the responsibility for coordinating the corporate long-range planning effort.

The bulk of Lockheed's staff support is located in the divisions. Under Lockheed's decentralized system, the divisions are responsible for operations and, therefore, have the staff for assistance with their operations.

Each of the divisions has at least one man with long-range planning responsibilities. The larger companies have planning staffs of several men. Within each of the specialized staff functions in the subsidiaries there are men with planning responsibilities. Thus, the formal planning function at Lockheed is decentralized in a manner parallel to the decentralization of its operations.

Planning at Lockheed is even more decentralized than the location of the designated "planners" would indicate. Hundreds of managers throughout the company become involved in the process at one point or another in the annual planning cycle.

Because manpower planning is an integral part of the whole divisional and corporate planning process, a review of that process is necessary to understand how Lockheed goes about manpower planning.

Planning the Planning

Lockheed plans for ten years into the future, and for three years in considerable detail. A new plan is begun annually. The whole cycle, from the start of the planning effort to the approval of a one-year operating budget, takes two years. The company is always at work on different stages of two different plans.

The process begins with a meeting of the division "planners" with the corporate development department and men from the functional corporate staff groups. All the major functions of the company are represented. They review past planning experience, suggesting improvements in the process. They discuss possible new objectives for the tenth year of the plan. They consider and recommend changes in the format to be followed in drawing up and presenting the plans of the divisions.

Following that meeting, the corporate development planning staff prepares a *Planning Guideline* and a *Format Guide*. The primary emphasis is, of course, the business plan, with functional plans in a secondary but highly important supporting role. This case report will concentrate on the functional plan for manpower. For each of the functions, the appropriate corporate staff group prepares suggestions, cautions, statements of assumptions, and other material that incorporates ideas developed at the planners' meeting and is intended to be helpful to the men in the divisions who will actually develop the detailed plans. For instance, the industrial relations section of the *Format Guide* is prepared by the corporate director for manpower resources with the cooperation of his colleagues in the industrial relations department.

The corporate development planning department pulls these separate inputs together, adds its own economic analysis and projections to the picture, and issues the document.

The division plans called for by the *Format Guide* are both comprehensive in scope and detail and integrated in the relationship of one part of the plan to the other parts. Following the format used by Lockheed in 1969, the division plans are divided into four main sections: Line of Business Plans, Functional Plans, the Division Profit Plan, and Data. (See Exhibit 13.)

The business operations of each division at Lockheed are grouped into "Lines of Business" —"groupings of products, services, programs, or investments based on common business characteristics in terms of customers, technology, man-

EXHIBIT 13

Format for Division Ten-Year Plans

(Abbreviated)

Lockheed Aircraft Corporation

Line of Business Plans

Title of First Line of Business

Datum Base

Definition of this line of business
Current posture and environmental trends
Table of programs
Table of critical developments expected in next three years

The Plan

Long range planning objectives
Objectives for the next three years
Table of division actions for the next three years
Strategy for the next three years

Assessment of the Plan

Title of Second Line of Business
(The plans for the second and additional lines of business are presented in the detailed format shown above.)

Function Plans

Title of the Function (e.g., Science and Engineering)

Datum Base

Definition of this function and its sub-functions
Current posture and environmental trends
Table of critical developments for the next three years

The Plan

Long range planning objectives
Objectives for the next three years
Table of division actions for the next three years
Strategy for the next three years

Assessment of the Plan

Title of the Next Function (e.g., Industrial Relations)
(The plans for each major function of the division are given in the detailed format shown above. The plans for each function are related to the lines of business detailed in the first section of the plan.)

Division Profit Plan

Datum Base

Current posture and environmental trends
Table of critical developments for the next three years

The Plan

Long range planning objectives
Objectives for the next three years
Table of division actions for the next three years
Strategy for the next three years

Assessment of the Plan

Data

For the Division
- Name
- Sales goals
- Profit goals
- Bid and proposal expenditures
- Independent development expenditures
- Facility expenditures
- Personnel requirements

For Each Line of Business
- Name
- Sales goals
- Market potential characterized by customer and probability estimate followed by entries giving changes for the market potentials that would result under specified alternative environmental estimates.

For Each Program Listed in the First Section of the Plan
- Name
- Sales potentials categorized by customer, program phase and probability estimate.

ufacturing techniques, or geographic location." The first section of a division's ten-year plan details the plan in terms of these lines of business.

A Line of Business Plan begins with a Datum Base, which lays the groundwork for the plan. After defining the particular line of business, the format calls for a statement of the current posture of that business in the markets it serves and a listing of the trends in the external business environment that could affect it during the ten years covered by the plan. A Table of Programs is next called for. A "program" could be a contract to manufacture a given number of aircraft for a particular customer, perhaps with certain design modifications built in. All programs relating to a given line of business are listed and briefly described.

The final item in the Datum Base is a Table of Developments that would have major impact on that line of business and that could occur in the next three years. The *Format Guide* explains that

> "Examples of developments to include are: customer actions, such as award or loss of a contract, cancellation of a procurement; competitor's actions, such as new competitors entering the field; development of different equipment or systems that could threaten this line of business; Lockheed or division decisions such as limitations placed on independent research and development funds or approval or disapproval of facilities expenditures."

Having laid a groundwork, the plan develops and evaluates possible courses of action. Under the heading of Long Range Planning Objectives, the divisions are instructed to "describe the sequence of objectives that are to be pursued in this plan in moving this Line of Business from its current posture to the long-range posture desired, giving the approximate date of achievement." Objectives for the next three years are listed next, together with the criteria to be used for measuring performance toward meeting the objectives.

A Table of Division Actions for the Next Three Years requires a listing and description of all the major alternative courses of action that are available to the division during the immediate future. This table provides the base for the next one—development of the Strategy—which presents the alternatives the division has chosen to follow, based upon the expected "critical developments" shown in the Datum Base.

Finally there is an Assessment of the Plan in which the division is to "describe the possible postures that the strategy given above could yield for this line of business in the third year of the plan. Estimate the probability of occurrence of each posture. Discuss the impact of these postures on the long-range plan."

If a division is involved in more than one line of business, and most of Lockheed's divisions are, then a separate Datum Base, Plan, and Assessment of the Plan are prepared for each line. For most corporations, that would represent quite advanced planning. Lockheed, however, doesn't stop its planning effort there because the plan thus far has not shown how the work of the various functions of the division will be integrated into an effort in support of the lines of business. Therefore, the next major section of the division's ten-year plan breaks the whole plan down by the separate functions of science and engineering, manufacturing and facilities, marketing, industrial relations, and administration.

For each of these functions the *Format Guide* calls for a Datum Base similar to the one required under Lines of Business. Environmental trends and critical developments are described in terms of their impact upon the function and its own ten-year plan. This section of the plan highlights developments in any of the lines of business that call for changes in the stance or activities of the function. Each function presents a "Plan" complete with long-range objectives, short-range objectives, tables of possible actions, and a selection of actions that constitute its chosen "Strategy."

The next section of the Ten Year Plan is the division's Profit Plan. Exhibit 13 indicates that much the same format is followed. This section goes over the same ground as earlier sections, highlighting those events that could have major impact on the division's profits. Examples might be a major change in a line of business, a major change in a customer's contracting practices, or a major change in one of the functions.

Finally, the fourth section of a Division Ten-Year Plan is called simply "Data." The format used is that of a computer printout. (See Exhibit 14.) The section presents in coded form the most important numerical data from earlier sections of the plan. It sets forth, year-by-year for the current and next three years (for some items, ten years) the levels of sales, profits, and expenditures anticipated. Total personnel requirements are given for four years.

The Planning Guidelines

Determining the format to be followed in developing and presenting a division's ten-year plan is central to planning the planning effort. Equally important, however, is the work represented by the *Planning Guidelines,* the second document issued to the divisions by the development planning department.

The *Guidelines* opens with a statement of Lockheed's basic purposes, objectives, and goals. Specific objectives are given in the areas of finance, markets, diversification, human resources, research and development, management techniques, and facilities. This is a broad preamble to the more detailed guidelines that follow, intended to set the context within which the divisions can develop their own long-range and short-range objectives.

The remainder of the *Planning Guidelines* is divided into two main sections: "Functional Planning Guidelines" are given for science and engineering, manufacturing and facilities, marketing, industrial engineering, and administration; "Environmental Premises" set forth the corporate economists' best estimates of the environment for business that will exist for the duration of the planning period.

In the "Functional Planning Guidelines," the corporate staff groups provide to the division planners information that the latter should keep in mind in developing their plans. For instance, changes in the economic, political, or social environment that could affect the company during the next ten years are set forth.

The instruction given to division planners who will be involved in developing the Industrial Relations section of a division's plans states that the "Table of Critical Developments for the Next Three Years should

> "Name and describe the developments, including critical manpower requirements (i.e., those which are vital to success or accomplishment, which are not now nor expected to be available, and which cannot be readily and easily obtained), that must be considered in the plan for the function. Include those lines of business developments which affect the function. Where critical requirements are listed, estimate the numbers required by field and function, using the skills inventory codes. Relate critical manpower requirements to appropriate technologies (from the Science and Engineering section) or, if not possible, by Line of Business for direct personnel and by function for indirect personnel."

Manpower concerns are not restricted to the Industrial Relations section of the *Planning Guidelines,* however; they appear throughout the document. For instance, the Science and Engineering section of a plan requires a "Table of Technologies." In Lockheed's terminology, a technology would be space physics, structures engineering, thermodynamics, or so forth. Each division must identify the technologies that are required by its lines of business. They must specifically identify the "heartland" technologies—those that are absolutely essential to its mission. The Science and Engineering planning requires an estimate of labor costs for each of the next three years for each of its technologies and the special identification of the costs related to its heartland. The *Planning Guidelines* state further that the plans for Science and Engineering should be further broken down by the labor costs required for getting business, for engineering design and development, for engineering support to the other functions, and for customer support activities.

The final section of the *Planning Guidelines* is devoted to "Environmental Premises," an economic outlook projected for a ten-year period. The assumptions about national and international

EXHIBIT 14

PLANNING DATA FORMAT, 1969-1979

(Simulated)

Ref. SAMPLE DATA

Prepared by: O. O. Burns
Div. CORLAC
Dept. 01-14
Date: 1/31/69

	DIV	LOB	PRG	INF	SC	69	70	71	72	73	74	75	76	77	78	79	
1	DIV	ALLØB	ALPRA	TIDIV	NØ	NAME ØF THE DIVISIØN											
2				GSTLB	6	329	299	277	538	1282	1315	1610	1615	1690	1820	1515	
3				GPTLB	5	10	-5	149	317	400	525	615	700	700	800	725	
4				BPTLB	5	10	12	18	22	25	30	10	21	10	10	30	
5				CDTLB	5	41	68	72	40	20	5	5	5	10	15	25	
6				CRTLB	5	20	20	20	22	22	22	23	23	24	26	26	
7				CFTLB	5	8	8	9	9	145	95	8	8	10	12	15	
8		PERSL		SPTLE	1	1182	1329	1471	1510								
9				TMTLE	1	3114	3294	3411	3338								
10				NTTLE	1	2166	2366	2569	2698								
11				SPFFE	1	162	176	191	195								
12				NTFFE	1	1005	1095	1182	1210								
13				SPICE	1	20	23	25	25								
14				TMICE	1	208	227	246	246								
15				NTICE	1	1	1	1	1								
16				SPØPE	1	575	695	820	855								
17				TMØPE	1	326	425	505	560								
18				NTØPE	1	705	805	920	1095								
19				SPREE	1	425	435	435	435								
20				TMREE	1	2580	2642	2660	2532								
21				NTREE	1	455	465	466	392								
22				TETLE	1	266	328	376	407								
23				SKTLE	1	3620	4309	4741	4849								
24				ØTTLE	1	5641	6259	7270	7641								
25				TLTLE	1	15989	17885	19838	20443	20605	20820	21400	21500	21600	21800	22000	
26	DIV	LØBCD	ALPRA	TILØB	NØ	NAME ØF LINE ØF BUSINESS											
27				GSTLB	6	10	15	25	40	40	45	55	60	60	60	60	
28				PMAR8	6	80	90	90	90	90	90	80	60	50	40	30	
29					PCCASE2			DN 40									
30					PCCASE3				UP 20			UP 40				DN 10	
31				PMAR6	6					10	15	25	80	80	90	100	

The codes in this section represent categories of personnel, e.g., SPTLE means all supervisory personnel, SPØPE means supervisory personnel in operations, while TMREE designates professional and technical personnel in research and engineering.

CØNTINUE FØR ALL CUSTØMERS, PRØGRAM PHASES, AND PRØBABILITY LEVELS

CØNTINUE FØR ALL PRØGRAMS IN LINE ØF BUSINESS

CØNTINUE FØR ALL LINE ØF BUSINESSES IN DIVISIØN events that underlie the projections are stated and then three "cases" are presented. Each represents a different set of possible circumstances about war or peace, the levels of spending for defense, and such matters. These projections are used to develop further estimates of the effects these conditions might have on Lockheed's business. The known or anticipated actions of some of the company's competitors are an element in some of the projections, as are anticipated actions by the company's major customers.

The probable rates of inflation, the possible directions of world monetary reform and other economic variables that would have an impact on business are set forth. Important among these are estimates of the rise of labor costs as a result of inflation and of continued wage increases over and beyond those caused by increases in the cost of living. Conversion factors are given so that division planners may convert constant-dollar to current-dollar labor costs for future years. The whole section of "Environmental Premises," supplemented by a separate economic outlook report, is intended to provide a base for the detailed planning that must be done by the divisions.

Thus the *Format Guide*, the *Planning Guidelines*, and, most importantly, the ten-year plans developed by the divisions in accordance with these instructions, all weave manpower considerations into the web of interrelated plans for the work of the divisions. The total is not a manpower plan, a marketing plan, or a manufacturing plan, but rather a plan for running the division so as to meet the objectives it has set for itself and make its contribution to the attainment of Lockheed's over-all objectives and goals.

The Actual Planning

The meeting of corporate and divisional planners, and the development and issuance of the *Format Guide* and *Planning Guidelines*, is only the start of the planning process. Now the work of planning moves into the divisions, laboratories, terminals, and other centers of operations. And the work is done not just by the men whose major responsibilities are planning, but by the majority of Lockheed's managers.

Divisional marketing people develop their assessment of the current strengths and weaknesses of their division in the markets they serve. They think through the possible alternative courses of action that might be taken to reach their division's marketing objectives. They select a series of actions that will constitute their marketing strategy for the next three years.

They also think through the manpower that will be required to achieve their objectives through their chosen strategy, and pass this information along to the division's industrial relations men. If training will be required, that information goes to the division training personnel as an imput to their planning.

Similarly, the other program and function managers are planning their own pieces of the action. Manpower considerations weigh in their planning and their requirements are passed along to those responsible for the division's manpower planning.

The "manpower planners" in industrial relations are at work, developing an estimate of the labor markets in which they will compete, and projecting probable labor costs. The responsible managers develop detailed plans for recruiting, training, organization changes, compensation, management and professional development.

The manpower plan for the division, reported in the Industrial Relations Function section of the Division Ten-Year Plan, reports the manpower impact of all the other programs and activities that are the chosen strategy for the division.

It is this phase of the long-range planning that takes the most time. The finished product, Ten-Year Plans for the nine divisions, are submitted to the corporate development planning department toward the end of summer. However, the planning effort is not over; it merely moves into the next phase.

In the fall the planners group meets again to go over the complete set of division plans. They apply their collective judgment to such questions as the realism of the specific actions that make up the various strategies, the adequacy of integration of the parts of the plans, and the soundness of the estimates and projections upon which the plans are based. Finally, they consider the composite plan that seems to emerge for the whole corporation when the nine division plans are combined.

From this composite review may emerge some adjustments in the division plans. Curtailment of some programs may be indicated to apply resources to more promising programs elsewhere. Manpower shifts among divisions may be arranged to prevent hiring one place while there are layoffs elsewhere. The work of actually developing the corporate long-range plan begins with the meeting of the planners group and is carried forward by the corporate staff during the remainder of the year. Shortly after the first of the year a draft Ten-Year Plan for the total corporation is ready for submission to top management.

The members of top management consider that draft plan for several weeks, making their own analysis and applying their own judgments individually. About March they are ready to meet formally. A three-day meeting is held, attended by the president and major vice presidents, the corporate staff and the divisional planners. The entire corporate plan is reviewed and final adjustments are made. By the end of the three days, Lockheed has added a new tenth year to its rolling ten-year plan and has adjusted the plans for the intervening years from those approved the year before.

The Corporate Master Plan, approved at the spring meeting, becomes the basis for a shorter-range Management Forecast. The Management Forecast is also done annually, in parallel with other planning. However, the Management Forecast is updated every six months by each division as is the Operating Budget. The link between the two—Plans and Forecast—is the "premises," prepared twice a year about two months in advance of the Forecast and the Budget. Corporate management revises and approves the premises prior to the divisions' preparation of their Forecasts and Budgets. As with most budgets, this plan spells out the resource allocations and commitments, the authority to invest in new facilities and equipment, and the levels of spending approved for a division's efforts to meet its goals. The Budget is a statement of the plan in dollar terms.

By the time an Operating Budget is approved, the planners are already one year into the development of new Ten-Year Plans for the divisions and for the corporation as a whole. The planning job at Lockheed never ends.

Special Manpower Studies

The manpower planning described thus far is, in some respects, "routine." It is part of an ongoing process of manging the company. Manpower planning at Lockheed involves other special, one-time studies as well.

For example, the corporate manpower administrator and the development planning department have carried out a study of alternative ways of meeting temporary demands for additional manpower. Lockheed's divisions have in the past met such demands in a variety of ways: they have had men work overtime, hired temporary employees, temporarily transferred men among divisions, employed engineering consultants when that was feasible, and contracted work to other organizations. It has not been clear, however, which of these methods of dealing with the problem was the most satisfactory.

Therefore, the planners have developed a computer model of manpower utilization in a typical division. The parameters of the model are such that various alternatives may be tried out and their effects determined. The planners' objective is to develop a tool that can be used by the divisions to make such decisions on a more rational basis in the future.

The corporate manpower administrator says that many manpower decisions are made today, in his company as elsewhere, on a seat-of-the-pants basis. Anything that might be called "scientific manpower management" is in its infancy at best. Little is known about the interrelationships of most of the major variables affecting manpower utilization; it is probable that some of the important variables have not even been identified as yet.

He says, for instance, that no one has yet developed a truly useful way to define and categorize job skills and, therefore, it is not possible to define effectively the requirements of jobs or

Glossary of Terms Used in the *Format Guide* to Division Ten-year Plans

Actions

The major division, functional, and Line of Business capabilities that can be used to achieve specific objectives and goals. The inventory of actions that are available to a division, function or Line of Business provides the options for development of strategies applicable to a broad spectrum of environment.

Environment

The forces, internal and external, that enhance or threaten the achievement of objectives and goals.

Forecast

A prediction of a future state, based on specific premises.

Line of Business

A grouping of products, services, programs or investments based on common business characteristics in terms of customers, technology, manufacturing techniques, geographic location, or other factors which form a sufficient basis for establishing a Line of Business.

Market Potential

The term is used for Line of Business data only. The total estimated sales volume available to industry for the given Line of Business.

Objectives and Goals

Specific corporate, division, line of business, program, etc., aims for the ten-year planning period which, to the extent feasible, should be quantifiable, actionable, and challenging.

Plan

The result of the process of developing objectives and the means to achieve them.

Posture

Status of strengths and weaknesses relative to achievement of objectives and goals.

Profit Goals

This term is used only for division totals. For a division, the total net profits that division plans to achieve.

Program

A program is defined as any important activity relevant to a function or line of business. A product or service is defined as a program. Specific facilities or groups of facilities can be programs. Research and development projects or specific activities are programs.

Sales Goals

This term is used for division and line of business data only. For a line of business, that portion of the sales potential that the division expects to capture. For a division, the total sales the division plans to make.

Sales Potential

This term is used for program data only. That portion of the market potential that will be competed for by the division assuming that the market potential does in fact develop.

Strategy

The major means to achieve an objective or goal. The major concept and design for deploying resources to achieve objectives and goals.

the skills that a given man might bring to a job. Under such circumstances, it is difficult to match men and jobs in a way that will benefit both the men and the organizations for which they work.

The special manpower studies that he and others at Lockheed undertake are attempts to isolate some of the important variables that affect manpower utilization and to determine how they interact. Eventually, managers will have a firmer base of hard data upon which to make the decisions that go into corporate manpower management.

What Are the Results of Manpower Planning?

The manpower planning effort is reflected in activities throughout the company. A plant develops an apprentice program and recruits young men for the training. High potential managers are spotted and developmental experiences are arranged for them. Men are hired, transferred, promoted, retired. These activities are commonplace in almost all companies.

Furthermore, they are planned activities in almost all companies—planned in the short-term, at least. The difference at Lockheed is not that industrial relations activities are carried out, or that they are planned, but rather that they are planned further into the future than is generally true, and planned in close support of the business activities of the company. That has not always been the case in industrial relations work.

The corporate director for manpower resources says that when he came to the job four years ago he was appalled at the crude state of the art in making manpower projections. He felt fully confident, however, that the time would come when "the president would ask how many thermodynamicists would be needed in five years on the XYZ project and I would be able to reply that it would be either 67 or 68, depending upon whether Joe got over his heart attack." However, after working in the manpower planning effort for some years, he says he no longer measures the effectiveness of manpower planning by the accuracy of its numbers.

He cites as an example of the true payoff from manpower planning a plant with a crucial need for machinists. This had not presented any problem because the plant had a stable force of machinists who had worked for the company for years. However, the requirements of the planning effort forced the plant mangement to examine the situation and to reach several unexpected and painful conclusions.

There *had* been low turn-over among the machinists. But that was about to change. The men were almost all within five or six years of retirement. Recruiting new machinists seemed a logical strategy. However, the plant industrial relations men learned that none were to be had in their local job markets; there were few other companies that employed machinists nearby and the low turn-over at the Lockheed plant had discouraged young men from entering the trade. Now the plant is training its own men with a newly developed apprentice program.

The corporate director for manpower resources says that it isn't really very important that the projection of the need for machinists in four, five, and six years at that plant be completely accurate. What *is* important, he says, is that a potential problem was identified in sufficient time for a plan of action to be developed and implemented.

In common with other aerospace companies, Lockheed has felt the pinch of the shift in the nation's economy in recent years. But even in difficult times, manpower planning is an aid to good management, according to Lockheed managers. The possibilities of turndowns and reversals have been anticipated in the "Environmental Premises" generated by the economists, and in the "Tables of Critical Developments" worked up by the division planners. The "Tables of Division Actions for the Next Three Years" present a variety of feasible actions, not just the ones that will make up the division's "Strategy." Therefore, division managers are alerted to the signs in their business environment that give early warning of problems to come, and they have alternative courses of action already developed from which they can select new strategies. Managing difficulties according to plan may be less pleasant than managing prosperity, say Lockheed mangers, but it is a lot easier than trying to manage them without a plan.

The major difference that manpower planning has made at Lockheed, according to the manpower administrator, is a subtle change of attitude. "We always used to say that our employees were our most valuable asset. We meant it too. But except for efforts to see that the employees were well treated, we didn't really act like they were an important asset. Now that our planning process forces us to look at our manpower as it relates to all our other resources and to the lines of business we're engaged in, we are thinking of our employees as a vital resource. And a resource, even a human resource, isn't something you just value and praise—it's something you plan to conserve and develop and utilize effectively."

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